Polychrome Manufacturing Site

WESTCHESTER COUNTY
YONKERS, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C360098

Prepared for:

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Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2019

CERTIFICATION STATEMENT

I, Rebecca Kinal, certify that I am currently a NYS registered professional engineer and that this Site Management 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).

Rebecca Kinal
Name

082046-1
NYS PE License Number

Signature

12/13/19
Date

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WESTCHESTER COUNTY
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SITE MANAGEMENT PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BGS	Below Ground Surface
BUD	Beneficial Use Determination
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulation
COC	Certificate of Completion
CSO	Combined Sewer Overflow
ConEd	Consolidated Edison
CP	Commissioner Policy
DER	Division of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
EC	Engineering Control
ECL	Environmental Conservation Law
ESA	Environmental Site Assessment
EWP	Excavation Work Plan
FER	Final Engineering Report
GSI	Geo-Solutions, Inc.
HASP	Health and Safety Plan
IC	Institutional Control
ISS	Insitu Soil Solidification
LIF	Laser Induced Fluorescence
LNAPL	Light Non-Aqueous Phase Liquid
MSL	Mean Sea Level
NAPL	Non-Aqueous Phase Liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
PID	Photoionization Detector
PRR	Periodic Review Report
PSI	Pounds per square inch
PUR	Planned Urban Redevelopment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control

Acronym	Definition
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RRES	Restricted Residential
RSO	Remedial System Optimization
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-slab Depressurization System
TAL	Target Analyte List
TCL	Target Compound List
USEPA	United States Environmental Protection Agency
VFD	Variable Frequency Drive
WCDEF	Westchester County Department of Environmental Facilities

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance, and reporting activities required by this Site Management Plan (SMP).

Site Identification: BCP Site Number C360098: Polychrome Manufacturing Site
80-94 Alexander Street, Yonkers, NY.

Institutional Controls	1. The Site may be used for restricted residential, commercial, or industrial use. 2. All Engineering Controls (ECs) must be operated and maintained as specified in this SMP. 3. All ECs must be inspected at a frequency and in a manner defined in this SMP. 4. The use of groundwater as a source of potable or process water is prohibited without necessary water quality treatment, as determined by the New York State Department of Health or the Westchester County Department of Health. 5. Groundwater monitoring must be performed as defined in this SMP. 6. Data and information pertinent to Site Management must be reported at the frequency and in a manner defined in this SMP or as otherwise approved by the Department. 7. The Remedial Party will complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375.8 (h) (3). 8. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP. 9. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP. 10. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP. 11. Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement. 12. Vapor mitigation system must be installed, operated, and maintained for any building developed in the area within the IC boundaries unless otherwise approved by the NYSDEC. 13. Vegetable gardens and farming on the Site are prohibited.
Engineering Controls	1. Cover System 2. Sub-Slab Depressurization System (SSDS) and Vapor Barrier 3. NAPL Recovery Well Network

Site Identification: BCP Site Number C360098: Polychrome Manufacturing Site
80-94 Alexander Street, Yonkers, NY.

Inspections	Frequency
1. Cover Inspection	Annually
2. SSDS Routine Inspection	Quarterly (first year) Annually (after first year)
3. SSDS Detailed Inspection	Semi-annually (first year) Annually (after first year)
Monitoring	**Frequency**
1. Sample Groundwater Monitoring Wells MW-A through MW-D	Annually
2. Gauge NAPL Recovery Wells (NW-1 through NW-5)	Monthly
3. SSDS Monitoring Point (Vacuum)	Quarterly (first year) Annually (after first year)
Maintenance	**Frequency**
1. Cover System	As needed
2. SSDS System Gauges and Blower	As needed
Reporting	**Frequency**
1. SSDS Inspection Report	Quarterly (first year) Annually (after first year)
2. NAPL Monitoring/Recovery Report	Quarterly
3. Groundwater Monitoring Report	Annually
4. Site-Wide Cover System Inspection Report	Annually
5. Periodic Review Report	1^{st} PRR 16 months after the COC, then annually
6. SSDS Maintenance Report	As needed following maintenance event

Further descriptions of these requirements are provided in detail in subsequent sections of this SMP.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Polychrome Manufacturing Site (also known as “Polychrome East” or “Building 3”), Yonkers, New York (hereinafter referred to as the “Site”). The Site is approximately 2.3 acres and is located at 80-94 Alexander Street, City of Yonkers, Westchester County, New York. The Site is also identified as Section 2, Block 2608, Lot 35 from Lots 29, 35, and 37 with the lot consolidation being effective October 2019. The Site is in the New York State Brownfield Cleanup Program (BCP) as Site No. C360098, which is administered by the New York State Department of Environmental Conservation (NYSDEC).

Alex I East, LLC entered into a Brownfield Cleanup Agreement (BCA) (Index No. C360098-06-12) on September 19, 2012 with the NYSDEC to remediate the Site as a Volunteer. The BCA was amended on April 13, 2016 to include Avalon Yonkers Sun Sites, LLC as a Volunteer. Collectively, Alex I East, LLC and Avalon Yonkers Sun Sites, LLC (Avalon) are hereinafter referred to as the Volunteer or Volunteers. For the purposes of this SMP, Avalon, the Owner, will perform the responsibilities of the Remedial Party. Figures showing the Site location and Site layout are provided as Figure 1 and Figure 2, respectively. The Site boundaries are further detailed in the metes and bounds Site description in the Environmental Easement provided in Appendix A.

After completion of the remedial work, some residual contamination remained at the Site, hereafter referred to as “remaining contamination”. Institutional Controls and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC and recorded with the Westchester County Clerk requires compliance with this SMP and all associated ECs and ICs.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. This SMP has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor’s successors and assigns. This SMP may be revised only with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and
- Failure to comply with this SMP is also a violation of ECL, 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and the BCA for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix B of this SMP.

This SMP was prepared by AKRF, Inc. on behalf of the Volunteers, in accordance with the requirements of the NYSDEC’s DER-10 (Technical Guidance for Site Investigation and Remediation), dated May 2010, and other guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and ECs required by the Environmental Easement for the Site.

1.2 Revisions

Revisions to this SMP will be proposed in writing to the NYSDEC project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements; operational changes to a remedial system; or other significant change to Site conditions. In accordance with the Environmental Easement, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in Site use required under the terms of the BCA, 6 NYCRR Part 375 and/or ECL.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan (provided as Appendix C).
- Notice within 48 hours of identifying any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire, flood, or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1.3 below includes contact information for the above notification. This will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B.

Table 1.3 - Notifications*

Name	Contact Information
Matthew Hubicki (NYSDEC Project Manager)	Phone: (518) 402-9605 Email: matthew.hubicki@dec.ny.gov
Sarita Wagh (NYSDOH Project Manager)	Phone: (518) 402-7860 Email: BEEI@health.ny.gov
NYSDEC DER Remedial Bureau C	Phone: (518) 402-9662
NYSDEC Section Chief Site Control	(518) 402-9543
NYSDEC Region 3 New Paltz	(845) 256-3000

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Yonkers, Westchester County, New York and is identified as Section 2, Block 2608, Lot 35 (consolidated in October 2019 from Lots 29, 35, and 37). The Site is approximately 2.3 acres and bounded by: Ashburton Avenue to the north, beyond which is the Greystone Bakery Voluntary Cleanup Program (VCP) site (No. V00361), located on the former Consolidated Edison (Con Ed) Woodworth Avenue Manufactured Gas Plant (MGP) site and the Metro North accessory building; the Metro North Rail Road Right-of-Way (ROW) to the east; Alexander Street to the west, followed by mixed commercial and industrial uses and a five-story development along the water to the west and northwest; and commercial use properties to the south. The owner of the Site parcel as of the date of this SMP is Avalon Yonkers Sun Sites, LLC.

2.2 Physical Setting

2.2.1 Land Use

The Site is being developed with one large U-shaped five-story residential building surrounding a connected, open-air parking garage, landscaped areas, grass pavers, and a short asphalt road along the southern Site boundary. The Site zoning designation at the time of this SMP is Industrial; however, the City of Yonkers has adopted a Planned Urban Redevelopment (PUR) special use permit that provides redevelopment with multi-family residential use.

The Site is located within the area identified in the May 2009 City of Yonkers Alexander Street Master Plan (May 2009 Master Plan). The May 2009 Master Plan ties together several planning initiatives including the November 2008 City of Yonkers Alexander Street Urban Renewal Plan and a City of Yonkers Brownfield Opportunity Area Plan[1]. The future land use of the Site is consistent with the goals of these plans, which include creating a transit oriented waterfront community with mixed residential and commercial uses.

Properties in the neighborhood surrounding the Site are zoned Industrial; however, many of these properties are also located within the boundaries of the May 2009 Master Plan and are currently undergoing redevelopment activities. Properties to the west and northwest of the Site are in active construction or are in the planning stages for multi-family residential redevelopment, with the exception of the property immediately to the north of the Site (Greyston Bakery VCP DEC#V00361), which is an active industrial bakery.

2.2.2 Geology

The Site is underlain by a layer of fill material consisting of trap rock screenings, sand, and gravel mixed with cinders, asphalt, concrete, wood, brick, glass, metal and other miscellaneous debris encountered to depths between approximately 15 feet and 20 feet below ground surface (bgs). The layer of fill materials is underlain by fine-grained sand with little silt and clay, contains shell fragments derived from Hudson River sediments, and is encountered at depths ranging 85 to 90 feet bgs, where bedrock is encountered. The Statewide Bedrock Geology Map (New York State Geological Survey, July 14, 1999) indicated that the Site is underlain by Inwood Marble.

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[1] As of December 13, 2019, the City of Yonkers Brownfield Opportunity Area Plan has not received certification by the NYS Department of State.

2.2.3 Hydrogeology

Groundwater flow direction at the Site, inferred from available topographic mapping of the surrounding area and previous on-Site investigations, is from east to the west and toward the Hudson River. Depth to groundwater at the Site typically ranges from 9 to 11 feet bgs and is tidally influenced.

According to the FEMA Flood Insurance Rate Map of the Site, effective September 28, 2007, the Site is located within the 100-year flood zone of the Hudson River; however, import of fill during the development of the Site raised the current Site grade to between 10 and 12 feet above mean sea level, which is out of the 100-year flood zone. No hydraulic conductivity data was generated during previous investigative work.

A groundwater contour map is not provided as a component of this SMP due to the high tidal influence of the shallow groundwater table at the Site.

2.3 Investigation History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports (with the exception of the Phase I and Phase II Assessments) referenced below are provided in Section 8.0 – References.

The Site was developed prior to 1898. Historical Site uses varied and included, but were not limited to: a lumber yard, a brewing company, a beer depot, operations by an oil company, a post office garage, a bakery, and operations by a photochemical company (known as Polychrome Corporation).

2.3.1 Phase I and Phase II Environmental Site Assessments

Various Phase I and Phase II Environmental Site Assessments (ESAs) (including sub-surface drilling) were completed at the Site between November 2006 and 2012. The environmental impacts documented during the Phase II ESAs were used as the basis for entering the BCP and development of the subsequent Remedial Investigation (RI) discussed further below.

2.3.2 Remedial Investigation

Between 2015 and 2016, Paulus, Sokolowski, and Sartor Engineering, PC (PS&S) conducted Remedial Investigation (RI) activities at the Site, which included investigations of the drain areas (inclusive of historical floor drains, trench drains, and catch basins), impacted soil areas, and groundwater. Soil analytical results reported volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals exceedances of the NYSDEC Restricted Residential (RRES) Soil Cleanup Objectives (SCOs). Soil samples were obtained from fill material, located approximately 0 feet to 20 feet bgs. Groundwater samples were collected and the samples exceeded the NYSDEC Ambient Water Quality Standards.

The conditions observed in the soil samples were generally consistent with the previously documented fill materials located onsite and in the surrounding area. RRES SCO exceedances included several areas of elevated mercury, lead, and copper as well as an individual soil sample located in the southeast corner of the Site with elevated levels of naphthalene, among other SVOCs.

Soil vapor analytical results confirmed that the on-Site vadose zone contained detectable levels of various VOCs, including VOCs listed in the NYSDOH Soil Vapor Decision Matrices.

2.3.3 Supplemental Remedial Investigation

To further refine the Site RI, Supplemental Site Investigation (SI) activities were conducted in accordance with the September 5, 2017 NYSDEC-approved SI Workplan. SI activities at the Site included the installation of additional soil borings, temporary wells, and soil vapor points.

Further evaluation of drain areas, soil, soil vapor, and groundwater documented similar results to the 2015 and 2016 RI findings discussed above. A non-aqueous phase liquid (NAPL) source area was identified during the 2017 SI. NAPL was observed within or along the macro core liners at soil boring SB-20 and additional delineation borings. The observed NAPL appeared to be dense and was generally located between 10 feet and 19 feet bgs, within the fill material above the native Hudson River sediments confining layer.

A fingerprint analysis was performed on the NAPL by Alpha Analytical. The results of the analysis resembled coal tar, a pyrogenic by-product commonly associated with former MGPs. It was determined that this coal tar-related contamination originates from a source to the north of the Site.

2.3.4 Pre-Design Investigation

A Pre-Design Investigation (PDI) was performed in February 2018 to further define the extent of coal tar related NAPL and elevated naphthalene observed above the native, buried Hudson River sediments. The data was used to refine the in-situ soil solidification (ISS) treatment areas for NYSDEC review and approval.

2.4 Remedial History

In 2018 and 2019, a Track 4 remedy was implemented at the Site in accordance with the May 2018 Remedial Action Work Plan (RAWP) prepared by PS&S and the July 2018 Decision Document prepared by the NYSDEC. The remedial activities conducted at the Site included the following:

- Excavation and off-site disposal of six underground storage tanks (USTs) in Excavation Areas A through E, as specified in the RAWP.
- Removal of an additional UST encountered during remediation.
- Excavation and off-site disposal of soil and historical fill materials from Excavation Areas 1 through 12, as specified within the RAWP.
- Removal of additional historical fill encountered beyond the original boundaries of Excavation Areas 3, 9, and 12 due to endpoint sample concentrations exceeding the Site Specific Reuse Criteria.
- Dewatering (including treatment of groundwater) of Excavation Areas in order to assist with the excavation to the final RAWP depths.
- Removal of additional grossly-contaminated petroleum soil encountered beyond the original boundaries in Excavation Areas 3, 4, B, and C.
- ISS of two units (i.e., Treatment Areas) to the depths and extents specified within the RAWP (displayed on Figure 3).

- Screening for indications of contamination [by visual means, odor, and monitoring with a photoionization detector (PID)] of all excavated soil.
- Collection and analysis of soil endpoint samples to evaluate the performance of the remedy.
- Appropriate off-site disposal of all soil/fill material removed from the Site in accordance with applicable federal, state and local regulations for handling, transport, and disposal.
- Installation of a vapor barrier/waterproofing membrane underneath the parking garage, and subgrade components of the sub-slab depressurization system (SSDS) beneath portions of the new building where warranted.
- Installation of NAPL recovery wells for post remediation monitoring and collection.

2.4.1 In-Situ Soil Solidification via Bucket Mixing

ISS, via bucket mixing, was conducted to solidify DNAPL contamination, specifically coal tar, located below the water table at two separate ISS Treatment Areas (identified as ISS Units in the RAWP). The ISS Treatment Area depths and lateral extents were based on data obtained during the PDI (described in Section 2.3.3). Prior to ISS activities, each Treatment Area was pre-cleared down to an elevation of +3 feet mean sea level (msl) in order to accommodate the swell generated during ISS mixing activities. Soil excavated as part of the pre-clearing process was stockpiled and sampled for reuse on-Site as general fill below the cover system. The ISS Treatment Areas are shown on Figure 3. Specifically, the following steps were completed as part of the ISS process:

- Each ISS Treatment Area was pre-cleared down to an approximate elevation of +3 feet msl by the remedial contractor (Posillico, Inc. of Farmingdale, New York).
- A concrete batch plant was mobilized to the Site by the remedial contractor’s subcontractor, Geo-Solutions, Inc. (GSI), to create a 20% cement mixture (i.e. grout) consisting of a 50/50 ratio of blast furnace slag and Portland cement. This ISS mix was designed by GSI in order to meet the performance specifications outlined in the RAWP, which consisted of: a minimum unconfined compressive strength of 50 pounds per square inch (psi) and hydraulic conductivity of $1x10^{-6}$ cm/sec.
- GSI conducted ISS mixing in this general order: split the ISS Treatment Area into smaller ISS cells, excavate with a hydraulic bucket excavator soil from each ISS cell within the treatment area to create a berm around the ISS cell, begin excavation of the center of the ISS cell followed by the sidewalls down to the final required depth with continuous grout addition (grout acts as shoring for excavation) while continuing to mix the grout and soil (including the bermed soil originally excavated) into a homogeneous ISS mix, verify by survey that the ISS mix depth meets the RAWP requirements, verify total requisite grout addition for each ISS cell, and collect necessary Quality Assurance/Quality Control (QA/QC) samples. Additional details can be found within the FER.

Approximately 4,292 cubic yards of contaminated soil was treated by bucket mix ISS.

2.4.2 Contaminated Soil Excavation and Disposal

Remedial excavations at the Site were completed between May 2018 and August 2018. The Site was excavated to various depths ranging from +3 to 0 feet msl.

A total of 12,297.76 tons (or approximately 8,198 cubic yards using a conversion factor of 1.5 tons per cubic yard) of soil/fill was excavated and removed from the Site as part of the remedial activities. Historical fill/soil and other soil excavated during the remedial actions were transported for off-site disposal as non-hazardous material to Clean Earth of Carteret facility located in Carteret, NJ; Clean Earth of Philadelphia facility located in Philadelphia, PA; or to the Atlantic County Utilities Authority Landfill located in Pleasantville, NJ. The extent of soil/fill remedial excavation is shown on Figure 3. Further information associated with soil/fill waste characterization and disposal can be found in the FER.

2.4.3 Petroleum Contaminated Groundwater Dewatering and Treatment

Between March 2019 and August 2019, 234,611 gallons of petroleum-contaminated groundwater was pumped from remedial and/or development excavations and containerized on-Site in frac tanks for off-site disposal. Containerized petroleum-contaminated groundwater was transported and disposed of at Clean Water of New York, Inc., located in Staten Island, New York. Further information associated with petroleum contaminated groundwater dewatering and treatment can be found in the FER.

2.4.4 Backfill Material

Backfill material varied throughout the Site, but generally was comprised of the following:

- Beneficial Use Determination (BUD) crushed concrete from on-Site demolition activities;
- Imported fill material from shallow street excavations associated with Site utility connections (sampled in accordance with NYSDEC guidance);
- ¾-inch diameter stone from Prospect Park, a NYSDEC-approved off-site Source; and
- Virgin trap rock material (various sizes) from Tilcon New York Inc., located in West Nyack, New York.

For virgin trap rock material with less than 10% fines, a letter from the facility stating that the source material was virgin trap rock was provided to the NYSDEC Project Manager for review and approval prior to using the material as Site fill. Non-virgin quarry material and/or material with greater than 10% fines was sampled in accordance with NYSDEC guidance and approved for import to the Site by the NYSDEC.

On-Site excavated soil was also re-used as backfill restricted to above the water table and below the Cover System. Soil reused on-Site was sampled in accordance with the July 24, 2018 Soil Reuse and Dewatering Plan (RAWP Submittal #5) and approved by NYSDEC as general fill prior to placement. Approximately 1,925 cubic yards of pre-cleared soils from ISS Treatment Areas and Site development excavations was approved for use as fill below the Cover System. Analytical results were submitted to NYSDEC for review, and upon approval, the material was used as backfill below the Site Cover System.

2.4.5 NAPL Recovery and Groundwater Monitoring Wells

Four groundwater monitoring wells and five deep NAPL recovery wells were installed at the Site at the locations shown on Figure 4. The objective of the groundwater monitoring wells is to monitor groundwater concentrations post remediation, while the objective of the NAPL recovery wells is to monitor, and if present, remove residual NAPL that may accumulate within the wells.

2.5 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated July 2018 are as follows.

2.5.1 Groundwater RAOs

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.5.2 Soil RAOs

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.5.3 Soil Vapor RAOs

RAOs for Public Health Protection

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

2.6 Remaining Contamination

2.6.1 Soil

Following soil/fill remedial excavations, endpoint samples were obtained and analyzed in accordance with the RAWP and/or in consultation with NYSDEC. Endpoint samples with exceedances of the NYSDEC RRES SCOs are detailed below and shown on Figures 5A and 5B. Tabulated values are provided as Tables 1A through 1D, with full analytical laboratory results provided in the FER.

VOCs

Detections were below the RRES SCOs.

SVOCs

Seven SVOCs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene] were detected in one or more samples at levels exceeding the RRES SCOs. Specifically: benzo(a)anthracene was detected above its RRES SCO of 1 ppm (maximum concentration of 20 ppm); benzo(a)pyrene was detected above its RRES SCO of 1 ppm (maximum 20 ppm); benzo(b)fluoranthene was detected above its RRES SCO of 1 ppm (maximum 25 ppm); benzo(k)fluoranthene was detected above its RRES SCO of 3.9 (maximum 7 ppm);

chrysene was detected above its RRES SCO of 3.9 ppm (maximum 20 ppm); dibenzo(a,h)anthracene was detected above its RRES SCO of 0.33 ppm (maximum 2.9 ppm); and indeno(1,2,3-cd)pyrene was detected above its RRES SCO of 0.5 ppm (maximum 13 ppm).

These SVOCs are polycyclic aromatic hydrocarbons, a class of compounds most commonly found in combustion byproducts that are frequently found in urban fill. All other detected SVOCs were below the RRES SCOs.

Metals

Three metals exceeded RRES SCOs in one or more of the end point samples, specifically, arsenic (maximum concentration of 17), lead (maximum concentration of 1,210 ppm) and mercury (maximum concentration of 58.4 ppm), above their RRES SCOs of 16 ppm, 400 ppm, and 0.81 ppm. All other detections were below the RRES SCOs.

2.6.2 Groundwater

On October 11 through 15, 2019, initial baseline groundwater samples were collected from groundwater monitoring wells MW-A through MW-D and analyzed for VOCs, SVOCs, and metals (total and dissolved). Groundwater samples with reported exceedances of the NYSDEC Technical Operational Guidance Series (TOGS) Ambient Water Quality Standards and Guidance Values (AWQSGVs) are detailed below and shown on Figure 6. Tabulated values are provided as Tables 2A through 2D.

VOCs

Six VOCs [1,2,4-trimethylbenzene, benzene, ethylbenzene, m,p-xylenes, o-xylene, and toluene] were detected in samples from one groundwater monitoring well (MW-D) at levels exceeding the AWQSGVs. Specifically: 1,2,4-trimethylbenzene was detected above its AWQSGV of 5 micrograms/Liter (µg/L) (maximum concentration of 5.7 µg/L); benzene was detected above its AWQSGV of 1 µg/L (maximum concentration of 11 µg/L); ethylbenzene was detected above its AWQSGV of 5 µg/L (maximum concentration of 8.5 µg/L); m,p-xylenes were detected above its AWQSGV of 5 µg/L (maximum concentration of 13 µg/L); o-xylenes was detected above its AWQSGV of 5 µg/L (maximum concentration of 6.3 µg/L); and toluene was detected above its AWQSGV of 5 µg/L (maximum concentration of 10 µg/L). No additional exceedances of the AWQSGVs for VOCs were reported.

SVOCs

Nine SVOCs [2,4-dimethylphenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, biphenyl, chrysene, indeno(1,2,3-cd)pyrene, and Phenol] were detected in one or more samples at levels exceeding the AWQSGVs. Specifically: 2,4-dimethylphenol was detected above its AWQSGV of 50 µg/L (maximum concentration of 57 µg/L); benzo(a)anthracene was detected above its AWQSGV of 0.002 µg/L (maximum concentration of 2.6 µg/L); benzo(a)pyrene was detected above its AWQSGV of 0.0 µg/L (maximum concentration of 2.4 µg/L); benzo(b)fluoranthene was detected above its AWQSGV of 0.002 µg/L (maximum concentration of 3.2 µg/L); benzo(k)fluoranthene was detected above its AWQSGV of 0.002 µg/L (maximum concentration of 1.1 µg/L); biphenyl was detected above its AWQSGV of 5 µg/L (maximum concentration of 12 µg/L);chrysene was detected above its AWQSGV of 0.002 µg/L (maximum concentration of 2.1 µg/L); indeno(1,2,3-cd)pyrene was detected above its AWQSGV of 0.002 µg/L (maximum concentration of 1.5 µg/L); and phenol was detected above its AWQSGV of 1 µg/L (maximum concentration of 340 µg/L).

Although typically analyzed and reported as a SVOC, naphthalene was also detected in two wells (MW-A and MW-D) above its AWQSGV when analyzed as a VOC with a maximum concentration of 1,000 µg/L. Note that the SVOC concentrations reported from MW-D were significantly higher than any of the other SVOC baseline groundwater sample concentrations reported at the Site.

With the exception of phenol, these SVOCs are polycyclic aromatic hydrocarbons, a class of compounds commonly found in combustion byproducts that are frequently found in urban fill. Biphenyl, naphthalene, and phenol are commonly associated with coal tar. All other detected SVOCs were below the TOGS AQGSGVs.

Metals

Four metals (iron, manganese, mercury, and sodium) were detected in one or more samples at levels exceeding the AWQSGVs. Specifically: iron was detected above its AWQSGV of 300 µg/L (maximum concentration of 1,530 µg/L); manganese was detected above its AWQSGV of 300 µg/L (maximum concentration of 468.7 µg/L); mercury was detected above its AWQSGV of 0.7 µg/L (maximum concentration of 8.43 µg/L; and sodium was detected above its AWQSGV of 20,000 µg/L (maximum concentration of 272,000 µg/L).

Similar, but slightly higher, concentrations were reported for the same analytes in the unfiltered groundwater samples analyzed. Additionally, antimony and lead were also detected above the AWQSGVs. All other detected metals were below the TOGS AWQSGVs.

2.6.3 DNAPL (Coal Tar)

The PDI (discussed in Section 2.3.3) utilized direct-push drilling techniques and analytical sampling to further evaluate and delineate areas on-Site where DNAPL (identified by fingerprint analysis as coal tar) and/or elevated naphthalene were observed during the RI or SI. Depth of visually observed coal tar and/or elevated naphthalene concentrations varied, but generally were reported at depths greater than 10 feet below the current Site grade. Consultation with NYSDEC is recommended for any excavation work that could encounter deeper, residual coal tar contamination not addressed by the ISS Treatment Areas shown on Figure 3.

2.6.4 Soil Vapor

As part of the RI and SI, a total of six soil vapor samples were collected and analyzed by PS&S. Analytical results are summarized below. Figures, tabulated data, and laboratory analytical reports were included within the 2018 Remedial Investigation Report (RIR).

Six VOCs [1,1,1-trichloroethane, cis-1,2-dichloroethene, methylene chloride, trichloroethene, tetrachloroethene, and vinyl chloride] identified in NYSDOH Matrix A, Matrix B, and Matrix C, were detected. Specifically: 1,1,1-trichloroethane was detected at a maximum concentration of 20.5 µg/m^3; cis-1,2-dichloroethene was detected at a maximum concentration of 694 µg/ m^3; methylene chloride was detected at a maximum concentration of 24 µg/ m^3; trichloroethene was detected at a maximum concentration of 2,310 µg/ m^3; tetrachloroethene was detected at a maximum concentration of 11 µg/ m^3; and vinyl chloride was detected at a maximum concentration of 140 µg/ m^3. The soil vapor samples identified above from the RIR were collected from various depth intervals ranging between 3.5 ft. to 6 ft. bgs, in close proximity to the water table. As outlined in Section 3, soil vapor intrusion is mitigated by the vapor barrier system beneath the entire building footprint, an open air parking garage, and installation and operation of an active SSDS beneath the ground floor of the residential portions of the building.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix C) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

Compliance with a series of ICs is required by the Decision Document to: (1) implement, maintain and monitor EC systems; (2) prevent future exposure to remaining contamination; and (3) limit the use and development of the Site to restricted residential, commercial, and industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on the Environmental Easement provided as Appendix A.

The ICs, as defined in the Environmental Easement, are:

- The Site may be used and developed for restricted residential, commercial, or industrial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater as a source of potable or process water is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or Westchester County Department of Health;
- Groundwater monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP or otherwise approved by the NYSDEC;

- The Remedial Party or Site Owner is required to complete and submit to the NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3) as further detailed in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- Vapor mitigation system must be installed, operated, and maintained for any building developed in the area within the IC boundaries unless otherwise approved by the NYSDEC; and
- Vegetable gardens and farming on the Site are prohibited.

3.3 Engineering Controls

Remaining contamination at the Site is addressed by Engineering Controls, which are:

1. A Site-wide Cover System consisting of concrete building slabs, soil cover areas with a underlying demarcation layer, pavement, and other hardscape components;
2. An active SSDS and a vapor barrier membrane beneath the on-Site building; and
3. A network of NAPL recovery wells and groundwater monitoring wells.

3.3.1 Site-Wide Cover System

Interim Cover System

Exposure to remaining contamination at the Site is prevented by an Interim Cover System installed Site-wide. The Interim Cover System is currently in-place with a soil cover component meeting RRES SCOs. This Interim Cover System, as shown on Figure 7A, consists of the following:

- Soil Cover: A minimum 2-foot thick surface soil cover consisting of imported soil materials, which meets the lower of protection of groundwater and RRES SCOs listed in 6 NYCRR Part 375, Table 375-6.8(b). A demarcation layer (which consists of a highly visible orange synthetic snow fence material) is installed beneath the soil cover to visually identify the limits of the cover system component;
- Parking Garage Concrete Slab: A minimum 6-inch thick concrete building slab for the parking garage area underlain by a vapor barrier (detailed in Section 3.3.2). The vapor barrier acts as the demarcation layer for this component; and
- Building Concrete Slab: A minimum 6-inch thick concrete building slab for the residential building area underlain by a vapor barrier and SSDS (detailed in Sections 3.3.2 and 3.3.3, respectively). The non-woven geotextile fabric beneath the SSDS layer acts as the demarcation layer for this component.

Figure 7A presents the location and cross-sections of the Interim Cover System components installed at the Site.

Future Cover System

Additional Cover System components (not previously listed in the Existing Cover System Section above) will be installed as redevelopment of the Site continues. These additional components consist of the following:

- Soil Cover: A minimum 2-foot thick surface soil cover[2] consisting of imported soil materials, which meets the lower of protection of groundwater and RRES SCOs listed in 6 NYCRR Part 375, Table 375-6.8(b), with the upper 6 inches of surface soil cover of sufficient quality to maintain a vegetative layer. A demarcation layer (which consists of a highly visible orange synthetic snow fence material) is installed beneath the soil cover to visually identify the limits of the cover system component[3];
- Asphalt Surface: A minimum 2-foot thick pavement section consisting of asphalt surface, sub-base, clean fill, and an underlying demarcation layer (i.e., highly visible orange synthetic snow fence material); and
- Concrete/Brick Walkways: A minimum 2-foot thick (in total) sidewalk section consisting of a concrete/brick surface, subbase, clean fill, and an underlying demarcation fabric (i.e., highly visible orange synthetic snow fence material).

Figure 7B presents the location and cross-sections of the Future Cover System components anticipated to be in place once redevelopment activities are complete.

The EWP provided in Appendix C outlines the procedures required in the event the Cover System is breached, penetrated, or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of the Cover System are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the Site, provided in Appendix D.

3.3.2 Vapor Barrier System

A Vapor Barrier System was installed beneath the building and parking garage concrete slab. The Vapor Barrier System consists of a Stego Wrap (20 mil) liner installed beneath the horizontal slab-on-grade. The vapor barrier system will serve in conjunction with the active SSDS (described in Section 3.3.3) to mitigate the potential for soil vapor intrusion to occur at the Site.

Figure 7A and Figure 7B presents the location and typical cross-sections of the Vapor Barrier System. As-built drawings of the Vapor Barrier System are provided in Appendix E.

3.3.3 SSDS

A SSDS was designed and installed beneath residential portions of the concrete slab of the on-Site building to allow the lateral movement, collection, and venting of potential soil vapor from below the building. The blower and exhaust stack will be installed in 2020 as

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2 In soil cover areas over an ISS treatment area, the soil cover consists of a minimum 4-foot thick surface soil cover meeting RRES SCOs.

3 In any locations where future excavations (e.g., installation and placement of root balls) penetrate the demarcation layer, the demarcation layer shall be replaced at the top of remaining Site soils, prior to backfill.

part of Site Management activities, prior to residential occupancy of the building (see Section 5.2 for additional information).

The SSDS consists of a subgrade 4-inch, Schedule 40 slotted polyvinyl chloride (PVC) piping network installed within a minimum 6-inch thick layer of gas-permeable aggregate. The sub slab piping is manifolded into two above ground 6-inch Schedule 40 PVC risers on the first floor. The two 6-inch risers manifold on the roof into one 8-inch Schedule 40 PVC exhaust, which connects to a blower and exhaust stack located on the roof. The major components of the SSDS include:

- Seven slotted 4-inch diameter PVC horizontal pipe runs embedded in a gas-permeable aggregate layer (ASTM #5 - ¾-inch stone) above the compacted subgrade;
- Two 6-inch Schedule 40 riser pipes;
- One exhaust stack consisting of the 8-inch riser pipe extending from the first floor to the roof, terminating a minimum of 10 feet from the top of the building's roof (and 25 feet from any adjoining or adjacent buildings, operable windows, heating, ventilating and air conditioning (HVAC) intakes, or any other air inlets); and
- Four sub-slab vacuum monitoring points.

Figure 7A and Figure 7B presents typical cross-sections of the subgrade SSDS components. As-built drawings for the SSDS are provided in Appendix E. Procedures for monitoring the SSDS are specified in the Site Monitoring Plan (Section 4.0 of this SMP).

3.3.4 NAPL Recovery and Groundwater Monitoring Wells

A network of NAPL recovery and groundwater monitoring wells were installed at the Site as presented on Figure 4. Groundwater monitoring wells were installed to monitor groundwater concentrations on-Site. NAPL recovery wells were installed to monitor and recover residual NAPL remaining on-Site.

3.3.5 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the Remedial Action Objectives identified by the Decision Document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

Site-Wide Cover System

The Site-wide Cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP, in perpetuity.

SSDS

The active SSDS will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that any monitoring data generated indicates that the SSDS may no longer be required, a proposal to discontinue the SSDS will be submitted by the Remedial Party to the NYSDEC and NYSDOH.

NAPL Recovery Wells

The NAPL recovery wells will be monitored at defined, regular intervals in accordance with this SMP. The NAPL recovery well network will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC.

Groundwater Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC with consultation with NYSDOH, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the Site Standards, Criteria and Guidance (SCGs), or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the groundwater monitoring well network will be submitted by the Remedial Party to the NYSDEC. Groundwater monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment, and/or control measures will be evaluated.

3.3.6 Excavation Work Plan

The Site was remediated for Restricted Residential use. Any future intrusive work that will penetrate the Cover System or encounter/disturb remaining contamination, including any modifications or repairs to the Cover System, will be performed in compliance with the EWP attached as Appendix C to this SMP. Work pursuant to the EWP would be included in the periodic inspection and certification reports (detailed in Section 7.0 – Reporting Requirements).

3.3.7 Health and Safety Plan and Community Air Monitoring Plan

Any work conducted pursuant to the EWP must be conducted in accordance with the procedures defined in the HASP and CAMP prepared for the Site. The HASP and CAMP are provided in Appendix D. The HASP was prepared in accordance with DER-10 and 29 Code of Federal Regulation (CFR) 1910, 29 CFR 1926, and all other applicable federal, state and local regulations. Based on future changes to state and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP would be updated and re-submitted with a notification to NYSDEC as detailed in the EWP.

The Site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are responsible for the safe performance of all intrusive work, the structural integrity of excavations, proper disposal of excavation dewatering, control of runoff from open excavations into remaining contamination, and for structures that may be affected by excavations (such as building foundations and footings). The Site owner will ensure that Site development activities will not interfere with, or otherwise impair or compromise, the engineering controls described in this SMP.

4.0 SITE MONITORING PLAN

4.1 General

This Site Monitoring Plan describes the measures for evaluating the overall performance and effectiveness of the remedy to reduce or mitigate residual contamination at the Site, the soil cover system, and all affected Site media identified below. This Site Monitoring Plan may be revised only with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of Site management are included in the Quality Assurance Project Plan (QAPP) provided in Appendix F.

This Site Monitoring Plan describes the methods to be used for:

- Groundwater sampling, analysis, and assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs);
- NAPL monitoring and recovery;
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Site Monitoring Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Groundwater monitoring well analytical sampling program requirements;
- NAPL monitoring well gauging and recovery program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Inspection requirements for cover system inspections;
- Monitoring requirements for sub slab monitoring points;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site-Wide Inspection

Site-wide inspections will be performed annually (beginning 16 months after receipt of the COC). Modification to the frequency or duration of the inspection will require approval from the NYSDEC. During these inspections, inspection forms will be completed, as provided in Appendix G – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

Inspections of all ECs installed at the Site will be conducted during the Site-wide inspection. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If Site records are complete and up-to-date.

Unscheduled inspections and/or sampling may take place when a suspected failure of the EC system has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the Site will be conducted within five days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within seven days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

A Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. Reporting requirements are outlined in Section 7.0 of this plan.

4.3 SSDS Inspection/Monitoring

An inspection of the SSDS will be performed quarterly (following system startup) to confirm the system is operating within design specifications. SSDS startup (including abovegrade piping and blower installation) will be completed prior to residential occupancy of the building. The specific operating range values outlined below will be updated following startup, as warranted. A round of baseline monitoring will also be conducted following the complete installation of the system. SSDS system components to be monitored include, but are not limited to, the components shown in Table 4.3 below.

Table 4.3 - SSDS Monitoring Parameters

Remedial System Component	Inspection Schedule	Monitoring Parameter	Operating Range
SSDS	Quarterly (first year) Annually (after first year)	Flow Rate (individual manifold legs)	40 to 100 cfm (to be updated post startup)
		Vacuum Reading (blower)	0.5 to 10 inches of H_2O (to be updated post startup)
		Induced Vacuum (vacuum monitoring points)	a minimum of 0.005 inches of H_2O (to be updated post startup)

Detailed SDSS inspection, monitoring, and reporting procedures are provided in Section 5.0 - Operation and Maintenance Plan.

If any equipment readings are not within their specified operation range, any SSDS equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system.

4.4 Groundwater Monitoring

A network of groundwater monitoring wells has been installed at the Site to assess the effectiveness of the remedy in mitigating impacts to on-Site groundwater and to assess the performance of natural attenuation following remediation.

The groundwater monitoring program includes the collection of groundwater samples from wells designated for groundwater quality monitoring. The groundwater monitoring well network consists of six 4-inch diameter monitoring wells (MW-A through MW-D), with 10-foot monitoring well screens set at elevations ranging from -6 to +4 feet msl to target the top of the groundwater table. Figure 4 presents the location of groundwater monitoring wells. Monitoring well construction details are included in Appendix H. The groundwater monitoring network was designed as detailed below.

- MW-A was designed to monitor groundwater quality near the petroleum hot spot observed within the combined Excavation Area B, 3, and 4;
- MW-B and MW-C were designed to monitor downgradient groundwater quality conditions; and
- MW-D was designed to monitor upgradient groundwater quality conditions.

Sample Frequency & Collection/Analysis Protocol

Groundwater sampling will be conducted annually for a minimum of two years (following issuance of the COC). An initial round of baseline sampling was completed in the fourth quarter of 2019 as described in Section 2.6.2. The initial baseline samples were collected and analyzed for VOCs (including 1,4-dioxane), SVOCs, and metals in accordance with the QAPP (Appendix F). The results will be formally submitted to NYSDEC with a recommended reduced analyte list for future annual sampling events. Additional NAPL monitoring and recovery will be performed as detailed in Section 4.5.

Detailed sample collection and analytical procedures and protocols are provided in Appendix I – Field Activities Plan and Appendix F – QAPP. Sampling logs are provided in in Appendix G - Site Management Forms.

In the event groundwater concentrations are found to be consistently below ambient water quality standards, the Site SCGs, or have become asymptotic at an acceptable level to NYSDEC over two years of sampling and reporting, the NYSDEC may approve a reduction in sample frequency or determine that no further groundwater sampling is required. If NYSDEC makes a determination to continue sampling after 2 years, the NYSDEC will re-evaluate groundwater quality trends no later than the end of the fifth year of monitoring.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC. Report deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

Groundwater Monitoring Well Repairs

If biofouling or silt accumulation occurs in a groundwater monitoring well, the well will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance. The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

4.5 NAPL Monitoring and Recovery

A network of NAPL recovery wells has been installed at the Site to monitor and recover mobile product (in the form of LNAPL or DNAPL) that remains on-Site or has potentially migrated on-Site since remediation was complete. LNAPL is mainly comprised of petroleum products originating from the Site whereas the DNAPL found on-Site was identified as coal tar by fingerprint analysis and originates from a source to the north of the Site. LNAPL and DNAPL recovery wells monitoring procedures are further detailed below. Figure 4 presents the location of LNAPL and DNAPL monitoring wells. NAPL recovery well construction details are included in Appendix H.

LNAPL Monitoring Wells

The network of four groundwater monitoring wells (MW-A through MW-D) discussed in Section 4.4 will also be used to monitor and recover LNAPL (if observed), which remains on-Site or has potentially migrated on-Site since remediation was complete. As noted in Section 4.4, the screened interval of MW-A through MW-D was designed to target the top of the groundwater table and residual LNAPL (if any), as further detailed below. It is not anticipated that MW-C or MW-D will have measurable LNAPL; however, they are subject to the same recovery protocol discussed in this section.

- MW-A was designed to monitor and potentially recover LNAPL that may be present within the combined Excavation Area B, 3, and 4; and
- MW-A and MW-B were designed to monitor and potentially recover LNAPL that may be present downgradient of the combined Excavation Area B, 3, and 4.

DNAPL (Coal tar) Recovery Wells

A network of five DNAPL recovery wells (NW-1 through NW-5) have been installed at the Site to monitor and recover DNAPL (coal tar) that was not subject to ISS treatment or has potentially migrated to the Site since remediation was completed.

DNAPL recovery wells are 4 inches in diameter and range in depth from 12 to 27 bgs. The bottom of each DNAPL monitoring well is equipped with a 10-or 15-foot PVC or stainless steel 40-slot screened interval with a pea gravel filter pack directly above a 3-foot sump. The screened interval was selected to target DNAPL located above the Hudson River sediments confining layer identified during the PDI. The DNAPL recovery well network was designed such that DNAPL would be monitored and recovered at on-Site areas of concern as further detailed below.

- NW-1 and NW-2 were designed to confirm that DNAPL has not migrated or was not left in place downgradient of ISS Treatment Area 1A/1B;
- NW-3 and NW-4 were designed to monitor and recover DNAPL, which has potentially migrated, or is currently migrating, to the Site along Ashburton Avenue since completion of the remedy; and
- NW-5 was designed to monitor and potentially recover residual DNAPL immediately south of ISS Unit 2.

LNAPL and DNAPL Monitoring Frequency and Recovery Protocol

LNAPL and DNAPL monitoring will be performed monthly (beginning post COC) for a period of two years to document the presence of LNAPL and DNAPL, if any. A round of baseline monitoring and recovery will also be conducted in the fourth quarter of 2019. Recovery of LNAPL and DNAPL will be performed if the following observations are made during monitoring.

- If the monitored thickness of LNAPL in the recovery well column is 6 inches or greater, LNAPL will be collected from the monitoring well and containerized for waste characterization and off-site disposal.
- If the monitored thickness of DNAPL in the recovery well sump is 6 inches or greater, DNAPL will be collected from the recovery well and containerized for waste characterization and off-site disposal.

Detailed NAPL recovery procedures and protocols are provided in Appendix I – Field Activities Plan and Appendix F – QAPP. Detailed waste characterization and disposal procedures are provide in Appendix C – Excavation Work Plan. Sampling logs are provided in in Appendix G – Site Management Forms.

The NYSDEC may approve the removal of monitoring requirements from certain NAPL recovery wells if no NAPL accumulation is observed during the initial two years of monitoring and reporting. If wells are determined by the NYSDEC to accumulate large quantities of NAPL over extended time periods, NYSDEC may require that the frequency of monitoring and recovery be increased or that recovery be conducted using an automated collection system.

If NYSDEC makes a determination to continue monitoring beyond the initial 2 years and/or to convert to an automated collection system, the NYSDEC will re-evaluate NAPL trends and associated NAPL monitoring/collection requirements no later than the end of the fifth year of monitoring.

4.6 Monitoring and Sampling Field Documentation

All monitoring and sampling activities will be recorded in a field book and associated sampling log as provided in Appendix G – Site Management Forms. Other observations (e.g., groundwater/NAPL monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the Site-specific Field Activities Plan provided as Appendix I of this document.

5.0 OPERATION AND MAINTENANCE PLAN

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor, and maintain the mechanical components of the SSDS remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the Site to operate and maintain the SSDS; and
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSDS is operated and maintained.

5.1 SSDS Performance Criteria

Confirm the SSDS is operating within the below parameters. The specific operating range values outlined below will be updated following startup, as warranted.

Table 5.1 – SSDS Performance Criteria

Monitoring Parameter	Range
Flow Rate (Each Riser Leg)	40-100 CFM
Vacuum Reading (Each Riser Leg)	0.5-10 in H_2O
Applied Vacuum (Each Monitoring Point)	a minimum of 0.005 in H_2O

5.2 SSDS Operation and Maintenance

Intrusion of contaminated soil vapor within the Site building is prevented by an active SSDS which induces negative pressure under the entire residential portion of the first floor building slabs, collects contaminated vapor, and subsequently discharges the vapor to the atmosphere above the roof of the Site building. The Site-specific design for the SSDS was developed prior to construction of the building, and installation of the blower will be completed in 2020 (see Appendix E for as-built drawings).

The major components of the SSDS include:

- Seven sections of slotted 4-inch PVC piping (R-1 through R-7) bedded in a gas permeable aggregate layer (clean ASTM #5 stone) below the building slab of the residential space at the Site (not below the parking garage);
- A 20-mil vapor barrier (Stego Wrap) below the entire building structure (inclusive of the parking garage);
- An appropriately sized PVC piping and connections connecting the slotted PVC sections to an above ground manifold and two vertical risers;
- One temporary blower (Fantech RN-3) and one temporary exhaust stack to be utilized during system startup;
- One sized 1.5 HP blower (Model NYC Blower, Compact Pressure Blower, Model 140606, Arrangement 4, or approved equal) with a variable-frequency drive (VFD) to generate the necessary design vacuum and air flow located across the residential space of the Site;
- One back-up 1.5 HP blower [the backup blower will also be utilized as the backup for the adjacent ATI BCP site (C360090) and Polychrome West BCP Site (C360099)];

- An effluent stack consisting of an 8-inch PVC riser pipe manifolded on the roof from two 6-inch PVC risers and terminating a minimum of 25 feet from any air intakes/vents and the east-adjacent garage or apartment buildings; and
- Four vacuum monitoring points.

The SSDS pipes, subgrade associated piping, and the vapor barrier were installed at the Site in 2019. The SSDS as-built drawings are provided in Appendix E.

The SSDS is designed to operate continuously, 24 hours a day, 7 days a week, 365 days a year, without any required adjustments or repairs, beyond routine maintenance items discussed further in Section 5. Regular system inspections, operation/maintenance parameter documentation descriptions, and performance assessment guidelines for the SSDS, are detailed below.

5.2.1 Startup

The SSDS will be in operation in late 2019 or early 2020, prior to residential occupancy. After any future event that requires SSDS restart, the following inspections and testing will be performed to ensure the system is balanced:

- Confirmation of acceptable air flow rate (40 to 100 cfm) from each of the SSDS risers by a visual inspection of gauges affixed to each of the manifold legs;
- Confirmation of acceptable vacuum readings from each of the SSDS risers (0.5 to 10 inches of H2O) by a visual inspection of magnehelic gauges affixed to each of the manifold legs and use of an appropriate manometer or portable vacuum gauging device; and
- Confirmation of acceptable induced vacuum (a minimum of 0.005 inches of H2O) beneath the entire first floor/basement slab from monitoring points MP-1 through MP-4 through the manual access of each point and use of an appropriate manometer or portable vacuum gauging device.

5.2.2 Routine System Inspection

Inspection of the SSDS will be in accordance with the frequency set forth in the table below in Section 5.2.3. The routine SSDS inspection check will consist of a visual inspection noting the individual flow rate and vacuum readings for each of the SSDS riser legs. The routine check will also note any alarms or unusual conditions (e.g., unusual odors, leaks, blower noise etc.). Typical routine maintenance items that should be addressed during these inspections include:

- Confirmation that the blower is operating and air is discharging through the exhaust piping to the roof;
- Confirmation that the gauges on each manifold leg are clean and within normal ranges; and
- Confirmation that the exterior of the SSDS control panel is clean.

In the event than an unusual condition is identified, notify a key contact listed in Appendix B of this SMP. Any maintenance completed for the SSDS should be documented in the Maintenance Log included as part of Appendix G.

5.2.3 Routine Operation and Maintenance

Operation of the SSDS will be monitored in accordance with the frequency and detail set forth in the table below. Monitoring of the SSDS will consist of a visual inspection of the complete system including checking to confirm that the SSDS blower is operating properly, observing all associated air flow and vacuum gauges and alarms to confirm system diagnostics, and identification and repair of any system malfunctions or problems (i.e., leaks, cracks, collection of condensation, etc.).

Monitoring Inspection or Sampling Type	Frequency	Maintenance Task
SSDS Routine Operations Inspection	Quarterly (first year) Annually (after first year)	System Inspections
SSDS Detailed Operation Inspection	Semi-annually (first year) Annually (after first year)	System Components

The SSDS will operate continuously at the Site and not be discontinued without written approval by NYSDEC and NYSDOH. The SSDS will remain in place and operational until permission to discontinue use is granted in writing by NYSDEC and NYSDOH.

Detailed SSDS Inspection and System Component Maintenance:

The detailed operations check will be performed to identify/rectify operations-based maintenance items, such as malfunctioning SSDS risers, piping runs, and/or other system components. Typical detailed maintenance items that should be addressed during these inspections include:

- Confirm/assess blower performance and integrity;
- Assess blower and determine need for replacement;
- Confirm/assess the operating condition of vacuum monitoring points MP-1 though MP-4; and
- Confirm/assess the structural integrity of concrete floor slabs overlying constructed SSDS manifold and piping runs.

In the event that a condition warranting system component maintenance or repair is identified, the appropriate reporting and maintenance should be conducted immediately. Manufacturer's recommendations for system component maintenance and maintenance logs are included in Appendices E and I.

5.2.4 Non-Routine Operation and Maintenance

In most instances, non-routine maintenance will be required due to operating conditions that are governed by the SSDS alarms and system telemetry, which operates within the building management system (BMS). The primary objective of system telemetry is to notify building personnel when operating conditions are likely to reduce or otherwise compromise efficiency, which could lead to uncontrolled intrusion of contaminated soil vapor into the Site building.

Most damage or problems associated with SSDS components will trigger the SSDS alarm to the BMS. Damage to any SSDS components will be noted in the routine and detailed system inspections and remedied upon identification.

In the event that low SSDS air flow rates or vacuum are observed anywhere in the system, further system balancing may be necessary to ensure that the combined air flow rates and vacuum in a given area of the Site achieve the minimum design requirements. Throttling valves for individual SSDS will be installed prior to as part of the startup of the SSDS.

5.2.5 Monitoring Devices and Alarms

The SSDS has a remote warning alarm system that notifies the maintenance personnel if the system is not operating properly (e.g., vacuum blower failure or low vacuum condition at the blower). In the event that a warning alarm is activated, applicable maintenance and repairs will be conducted, as specified in this Operation and Maintenance Plan, and the SSDS will be restarted. Operational problems will be noted in the Periodic Review Report (PRR) to be prepared for that reporting period.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness, and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

In accordance with the PUR and local regulations, the Site elevation was raised from as low as approximately +6 feet msl to a minimum of +10 feet msl prior to redevelopment. The increase in Site elevation will reduce the impact of future major storms by raising the Site above the 100-year flood plain elevation.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including Site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during Site management, and as reported in the PRR.

The SSDS was designed specifically to eliminate waste generation from condensate within the system by installing sub-slab condensate drains. Additionally, the SSDS blower is provided with a VFD to balance/optimize the system, in turn reducing the energy usage. Efforts to balance the SSDS system should be documented and included within the PRR.

6.2.1 Timing of Green Remediation Evaluations

For the SSDS, green remediation evaluations and corresponding modifications may be undertaken, if specifically requested by the NYSDEC Project Manager, as part of a formal Remedial System Optimization (RSO). Modifications resulting from green remediation evaluations will be implemented as necessary and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 SSDS

As previously noted, the SSDS will be active and not discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. Consideration will be given to optimized operating rates to reduce energy usage, as long as the performance monitoring requirements are achieved.

6.3 Remedial System Optimization

A RSO study for NAPL recovery and operation of the SSDS is not required unless the NYSDEC or the Remedial Party request in writing that an in-depth evaluation is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;

- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the Site management to another Remedial Party or agency; and
- A new and applicable remedial technology becomes available.

The RSO will provide a critique of the Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focus on overall Site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to Site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All Site management inspection, maintenance and monitoring events will be recorded on the appropriate Site management form provided in Appendix G. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements listed in the following table and included in the Periodic Review Report:

Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency[1|2]
SSDS Inspection Report	Quarterly (first year) Annually (after first year)
NAPL Monitoring/Recovery Report	Monthly NAPL Monitoring Quarterly Reporting
Groundwater Monitoring Report	Annually
Site-Wide Cover System Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by NYSDEC
SSDS Maintenance Report	Following Maintenance Event

1. Reports will be submitted within 45 days of completion of the inspection/monitoring/maintenance event (unless otherwise required by the NYSDEC). Reports will be submitted to the NYSDEC as a stand-alone report or included as an attachment in the PRR if an inspection/monitoring/maintenance event is completed within 45 days of a PRR submission.
2. A baseline SSDS inspection/NAPL Monitoring/Groundwater Monitoring Event will be conducted in 4th quarter 2019 (specifically following system startup for the SSDS inspection). Post-remediation monitoring and reporting will commence in accordance with the frequencies above following issuance of the COC.

All monitoring/inspection reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., groundwater);
- Copies of all field forms completed (e.g., well sample logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

SSDS maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A PRR will be submitted to the Department beginning 16 months after the COC document is issued. After submittal of the initial PRR, a PRR shall be submitted annually to the NYSDEC unless otherwise modified by the NYSDEC. In the event that the Site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the Site described in Appendix A – Environmental Easement. For the purposes of this SMP, Avalon, the Owner, will perform the responsibilities of the Remedial Party. Appendix J has been reserved as a placeholder in the event that changes occur in the future resulting in separate parties being Owner and Remedial Party. The PRR will be prepared in accordance with NYSDEC's DER-10 and submitted within 45 days of the end of each certification period. Media sampling results will be incorporated into the PRR. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual Site inspections and severe condition inspections, if applicable.
- All applicable Site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Data summary tables (if samples collected) and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for any samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.
- A Site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the Decision Document;
  - The operation and the effectiveness of the SSDS, including identification of any needed repairs or modifications;

- o Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored, including NAPL recovery;
- o Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
- o Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document; and
- o The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Certification of Institutional and Engineering Controls will be included in the PRR.

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the PRR, the following certification as per the requirements of NYSDEC DER-10:

"For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:

- The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- Based on the visual inspection of the Cover System performed by or under the supervision of a Qualified Environmental Professional, the institutional controls and engineering control employed at this Site are unchanged from the date the control was put in place, or last approved by the NYSDEC;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;
- Access to the Site will continue to be provided to the NYSDEC to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- Use of the Site is compliant with the Environmental Easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices; and
- The information presented in this report is accurate and complete.

I certify that 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, [INSERT NAME], of [INSERT BUSINESS], am certifying as the Owner's Designated Site Representative for the Site."

Five years following the initial PRR, the following statement (if true) shall be added:

- The assumptions made in the qualitative exposure assessment remain valid.

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located, and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

In the event that an RSO be performed (see Section 6.3), an RSO report must be submitted to the NYSDEC for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual Site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required. The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the Site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

1. 6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
2. NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".
3. NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).
4. Paulus, Sokolowski and Sartor Engineering, PC – Remedial Investigation Report for Polychrome East Site, dated November 2017 and stamped May 31, 2018.
5. Paulus, Sokolowski and Sartor Engineering, PC – Remedial Action Work Plan for Polychrome East Site, dated and stamped May 31, 2018.

FIGURES

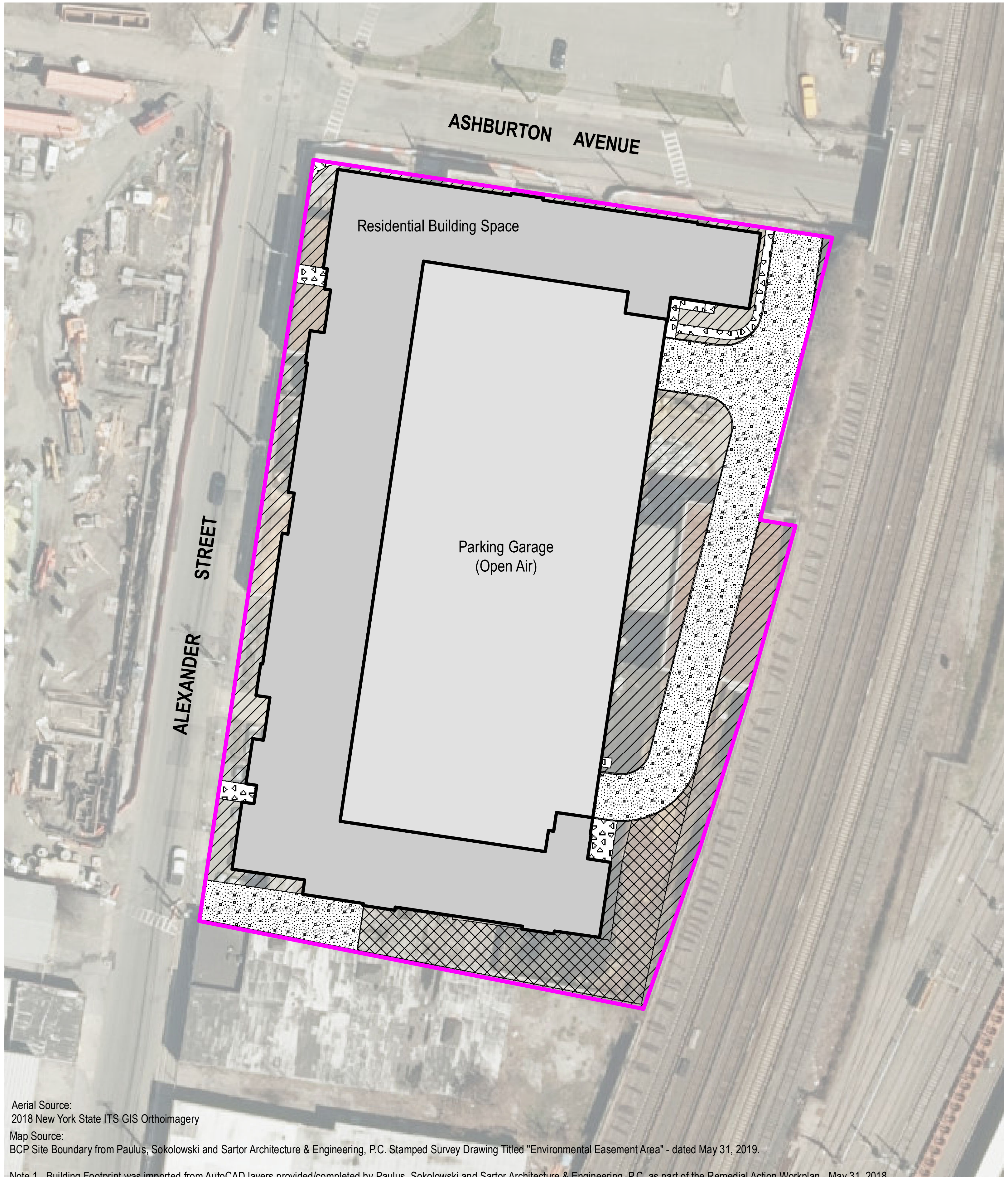
Service Layer Credits: ESRI Worlwide Street Map data; 2019.

Map Source - BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C.
Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

0 800 1,600
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

Polychrome East **NYSDEC Site (BCP #C360098)** Yonkers, New York	DATE **12/12/2019**
	PROJECT NO. **180132**
SITE LOCATION MAP	FIGURE **1**



LEGEND

- BCP SITE BOUNDARY
- RESIDENTIAL BUILDING SPACE
- PARKING GARAGE (OPEN AIR)
- SIDEWALK
- GRASS PAVER
- ASPHALT
- LANDSCAPED

0 30 60 120

SCALE IN FEET

Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.

AKRF
440 Park Avenue South, New York, NY 10016

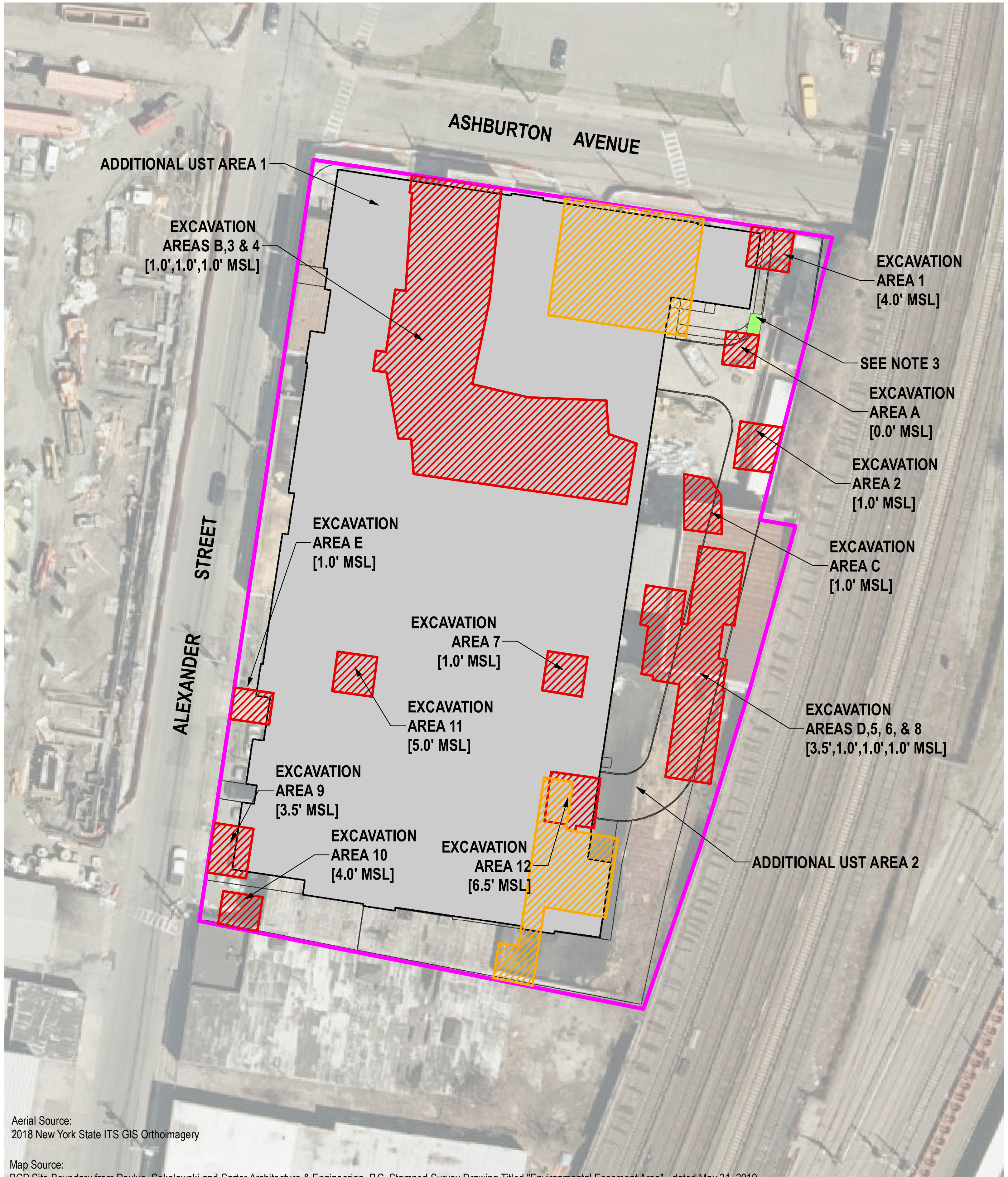
Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

SITE LAYOUT PLAN (GROUND FLOOR)

DATE 12/12/2019

PROJECT NO. 180132

FIGURE 2



LEGEND

- BCP SITE BOUNDARY
- BUILDING FOOTPRINT
- ISS TREATMENT AREA (OR UNIT)
- EXCAVATION AREA EXTENTS
- NOT EXCAVATED (SEE NOTE 3)

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.

Note 2 - Remedial Excavation and ISS extents were surveyed prior to remedial action by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. and provided as part of the updated "Remedial Action Workplan (RAWP) Remedial Action Site Plan Revisions" - August 9, 2018.

Note 3 - No UST observed within excavation footprint; soil from this portion of Excavation Area A placed back in excavation after consultation with NYSDEC.

0 30 60 120

SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

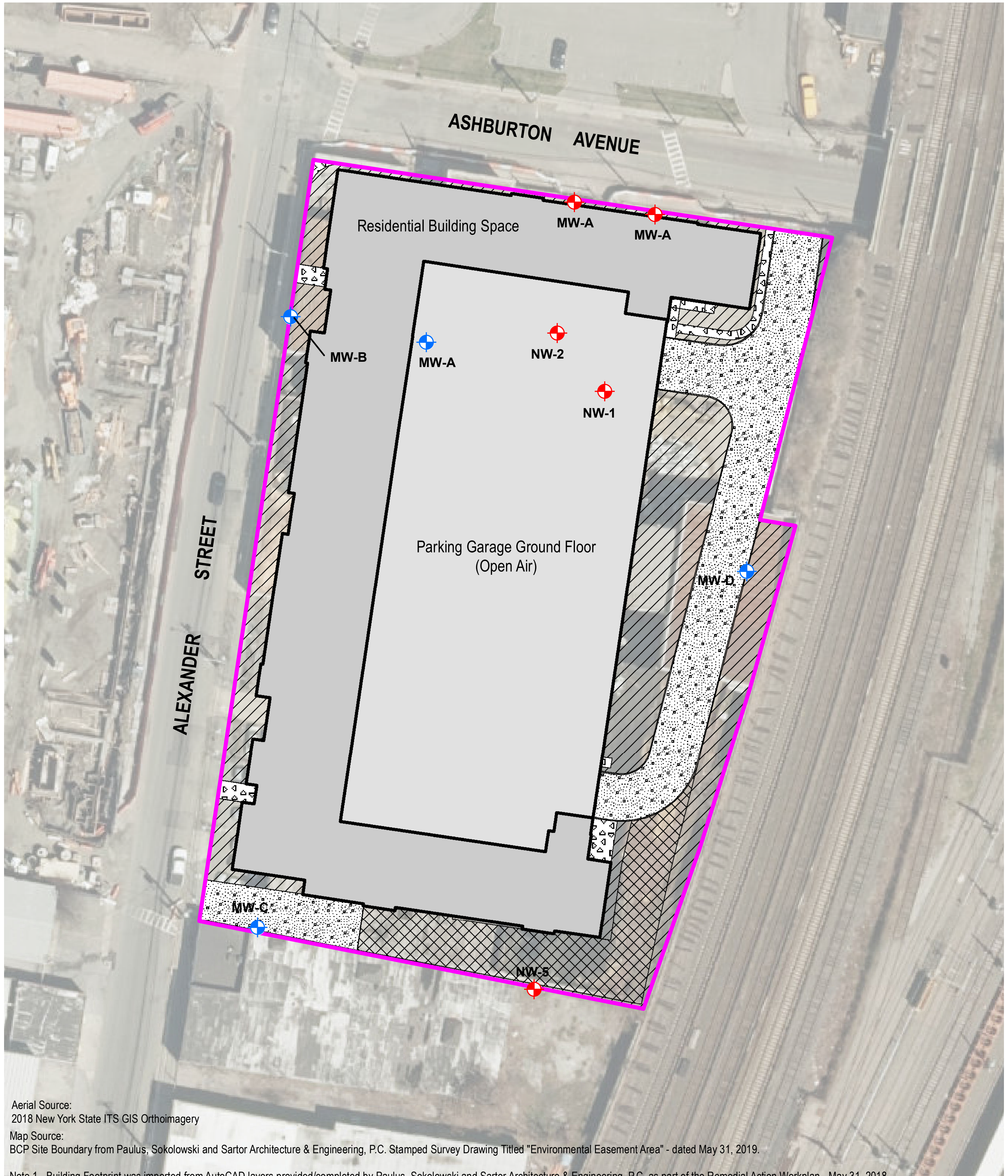
Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

EXTENT OF REMEDIAL ACTION PERFORMED

DATE 12/12/2019

PROJECT NO. 180132

FIGURE 3



Aerial Source:
2018 New York State ITS GIS Orthoimagery

Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.

LEGEND

- BCP SITE BOUNDARY
- RESIDENTIAL BUILDING SPACE
- PARKING GARAGE (OPEN AIR)
- CURRENT SIDEWALK
- CURRENT GRASS PAVER
- CURRENT ASPHALT
- CURRENT LANDSCAPED
- NAPL RECOVERY WELL LOCATION
- GROUNDWATER MONITORING WELL LOCATION (SHALLOW LNAPL RECOVERY)

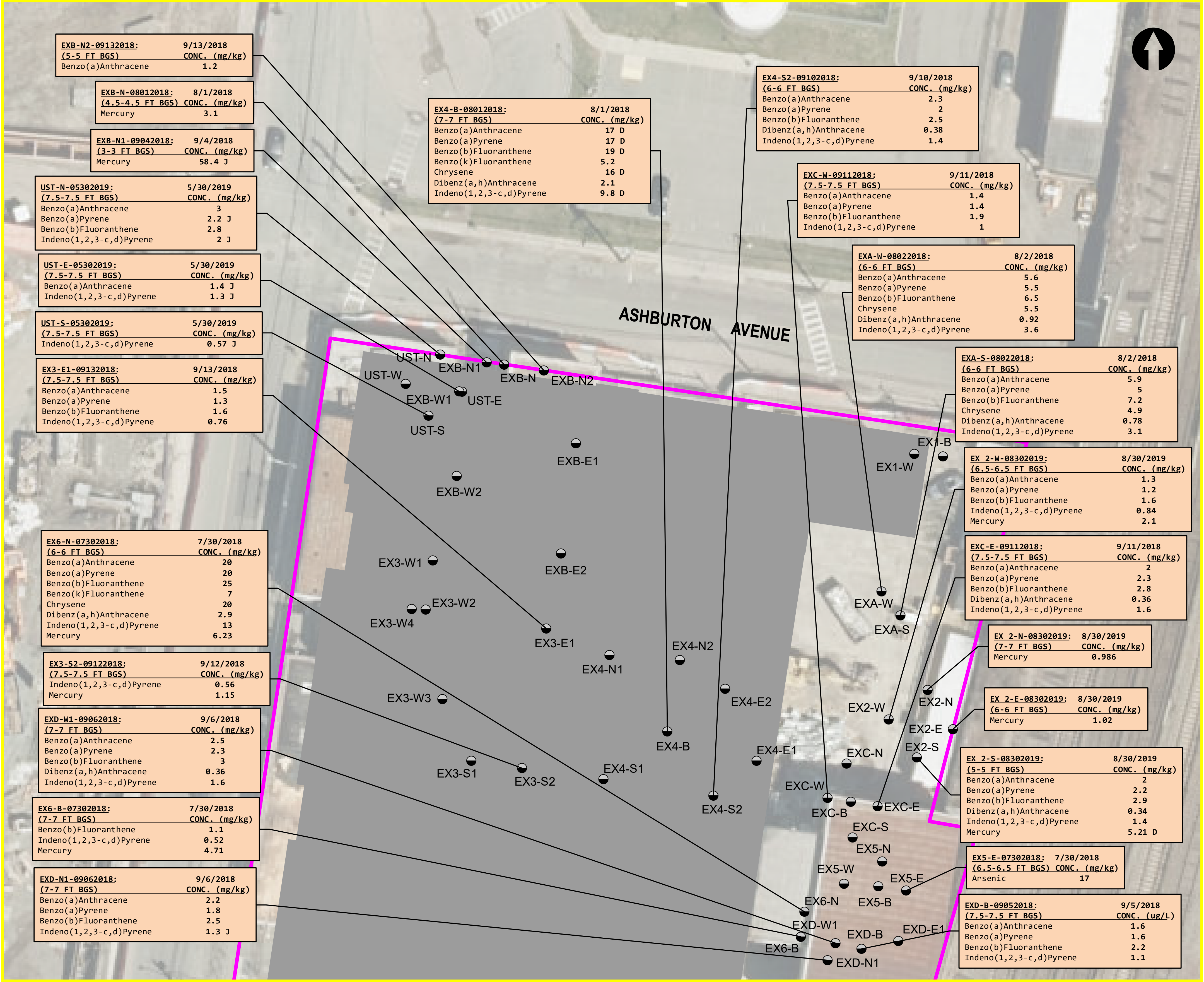
0 30 60 120
SCALE IN FEET

AKRF
34 S. Broadway #401, White Plains, NY 10601

Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

NAPL RECOVERY AND GROUNDWATER MONITORING WELL LOCATION PLAN

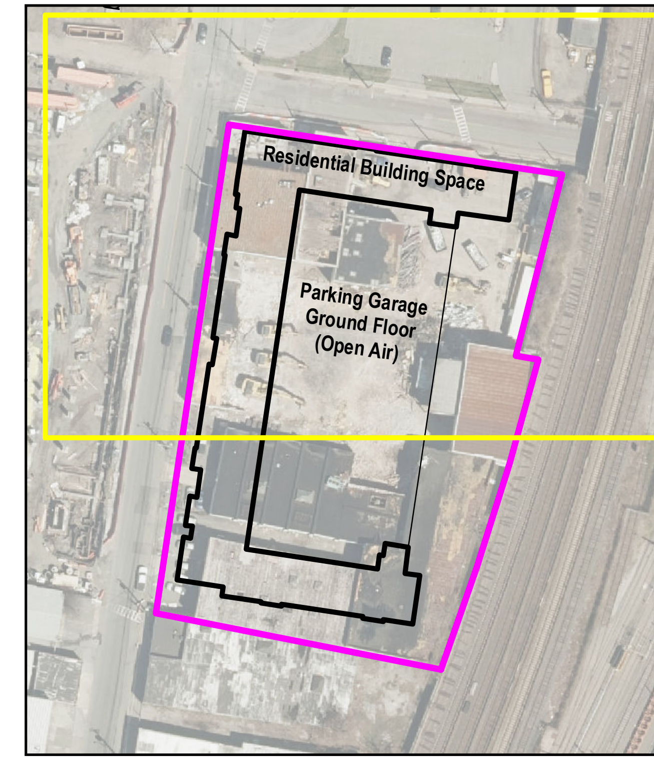
DATE 12/12/2019
PROJECT NO. 180132
FIGURE 4



Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.

Note 2 - EX3-W2-09132018 Sample exceedance removed from figure as additional excavation was completed to remove the area represented by this sample.



KEY MAP

SCALE: 1" = 150'

	Part 375 Restricted Residential mg/kg
Volatile Organic Compounds	
Acetone	100
Semivolatile Organic Compounds	
Acenaphthene	100
Acenaphthylene	100
Anthracene	100
Benzo(a)Anthracene	1
Benzo(a)Pyrene	1
Benzo(b)Fluoranthene	1
Benzo(k)Fluoranthene	3.9
Chrysene	3.9
Dibenz(a,h)Anthracene	0.33
Dibenzofuran	59
Fluoranthene	100
Fluorene	100
Indeno(1,2,3-c,d)Pyrene	0.5
Phenanthrene	100
Pyrene	100
Metals	
Arsenic	16
Lead	400
Mercury	0.81

Qualifier	Description
D	Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
J	The reported value is estimated

LEGEND

- BCP SITE BOUNDARY
- BUILDING FOOTPRINT
- ENDPOINT SAMPLE LOCATION

0 20 40 80

SCALE IN FEET

AKRF

34 S. Broadway #401, White Plains, NY 10601

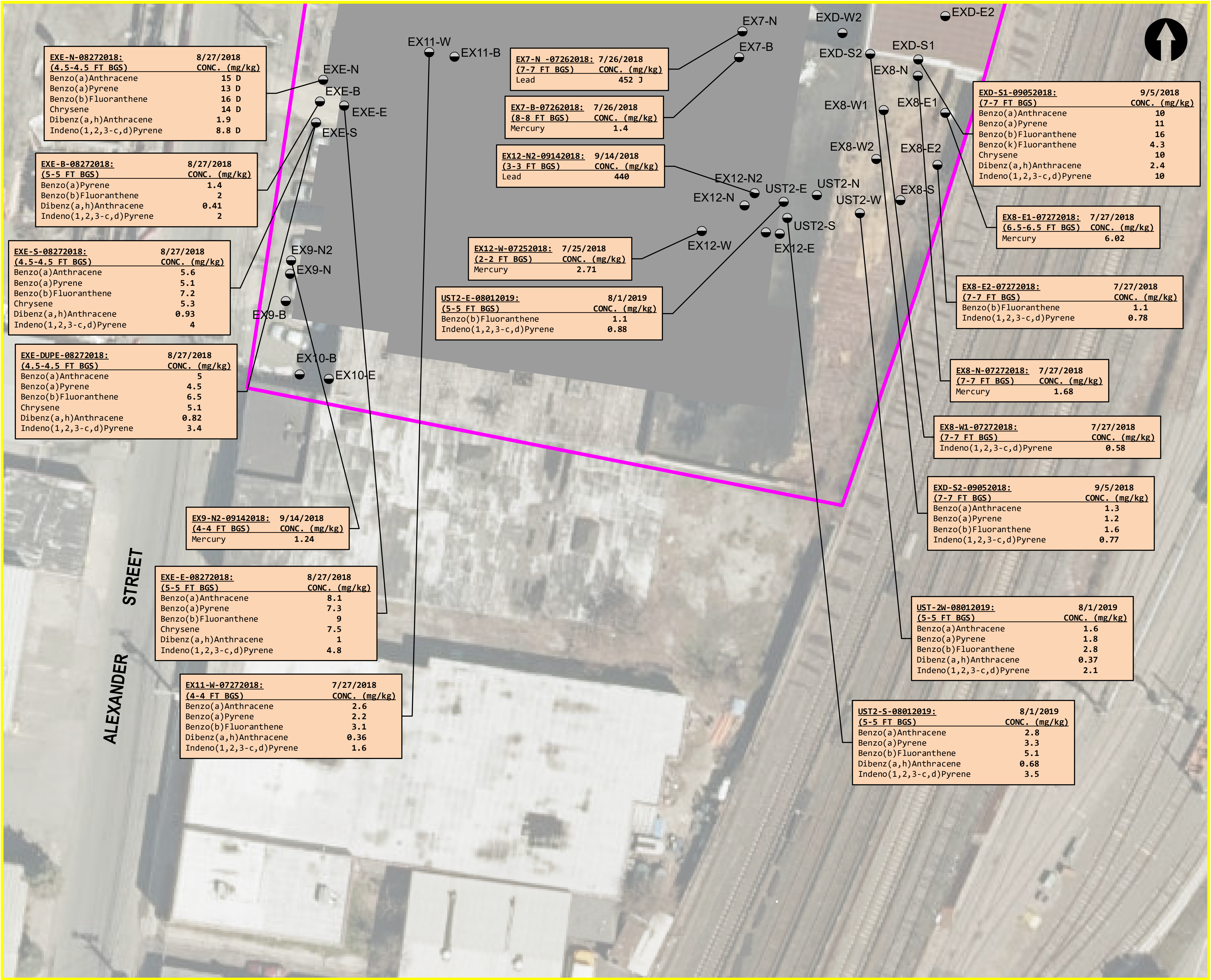
Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

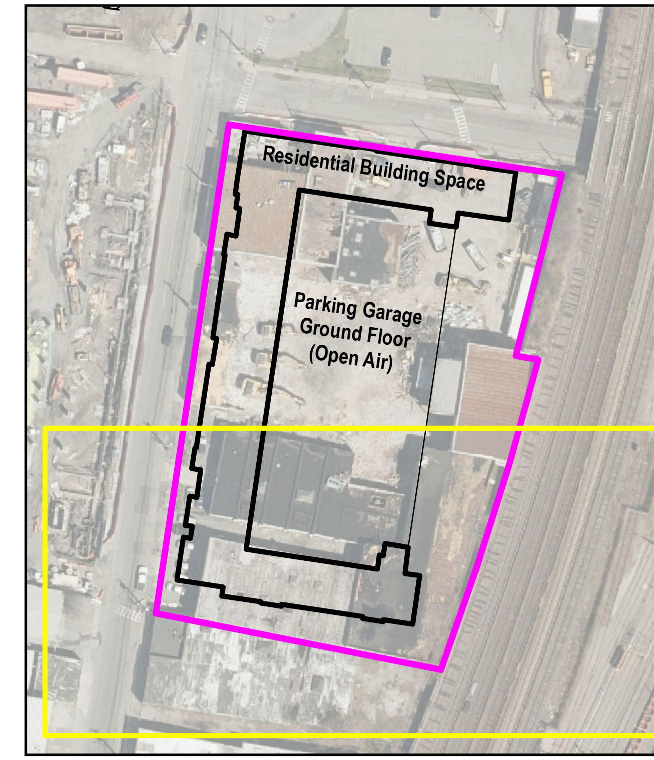
RA EXCAVATION ENDPOINT SAMPLES

DATE
12/12/2019

PROJECT NO.
180132

FIGURE
5A





KEY MAP

SCALE: 1" = 150'

	Part 375 Restricted Residential mg/kg
Volatile Organic Compounds	
Acetone	100
Semivolatile Organic Compounds	
Acenaphthene	100
Acenaphthylene	100
Anthracene	100
Benzo(a)Anthracene	1
Benzo(a)Pyrene	1
Benzo(b)Fluoranthene	1
Benzo(k)Fluoranthene	3.9
Chrysene	3.9
Dibenz(a,h)Anthracene	0.33
Dibenzofuran	59
Fluoranthene	100
Fluorene	100
Indeno(1,2,3-c,d)Pyrene	0.5
Phenanthrene	100
Pyrene	100
Metals	
Arsenic	16
Lead	400
Mercury	0.81

Qualifier	Description
D	Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
J	The reported value is estimated

LEGEND

BCP SITE BOUNDARY

BUILDING FOOTPRINT

ENDPOINT SAMPLE LOCATION

0 20 40 80

SCALE IN FEET

Aerial Source:
2018 New York State ITS GIS Orthoimagery

Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.

Note 2 - EX9-N-07272018, EX12-N-07262018, and EX12-E-07262018 Sample exceedances removed from figure as additional excavation was completed to remove the area represented by these samples.

AKRF
34 S. Broadway #401, White Plains, NY 10601

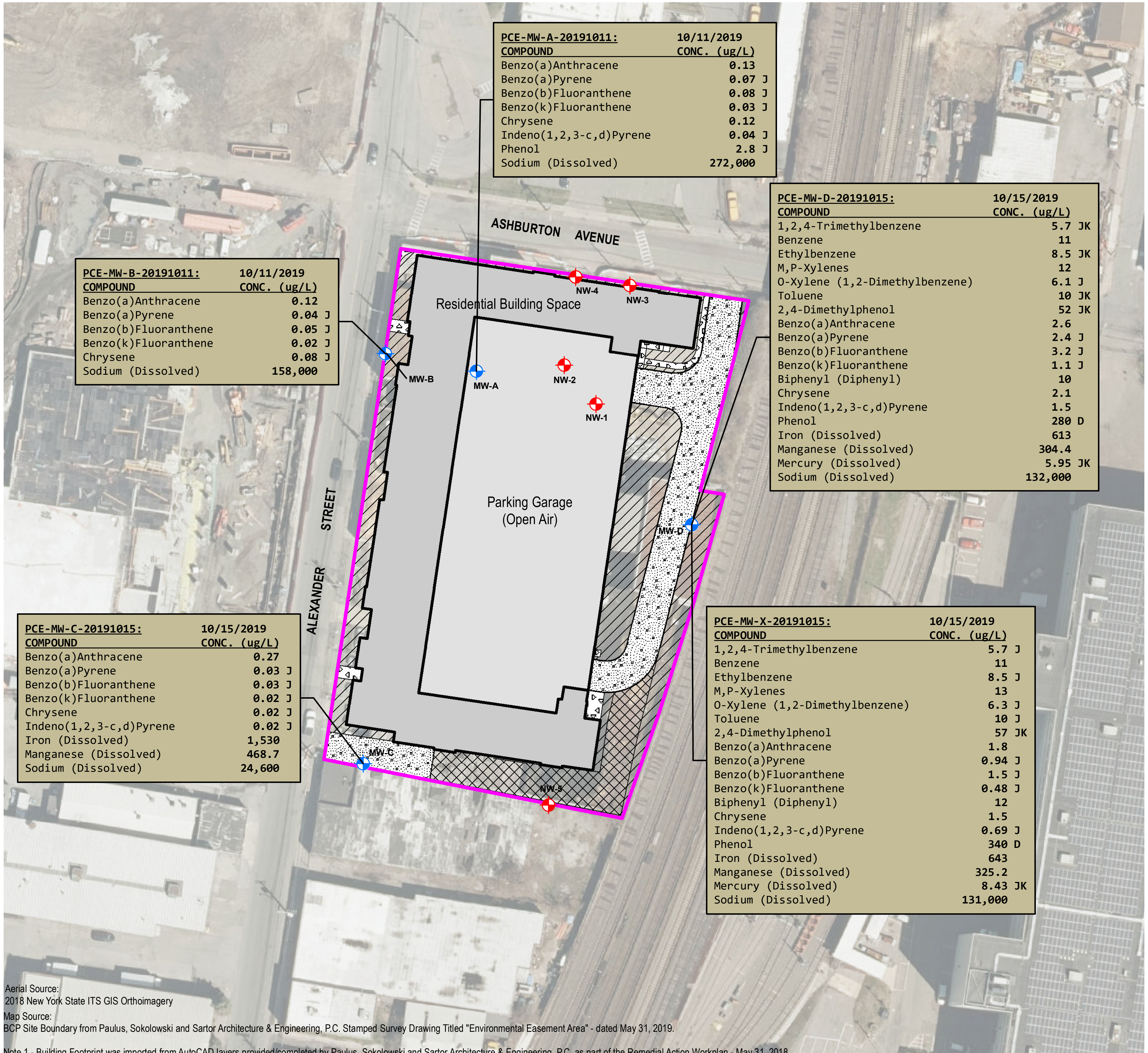
Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

RA EXCAVATION ENDPOINT SAMPLES

DATE
12/13/2019

PROJECT NO.
180132

FIGURE
5B



PCE-MW-A-20191011:	10/11/2019
COMPOUND	CONC. (ug/L)
Benzo(a)Anthracene	0.13
Benzo(a)Pyrene	0.07 J
Benzo(b)Fluoranthene	0.08 J
Benzo(k)Fluoranthene	0.03 J
Chrysene	0.12
Indeno(1,2,3-c,d)Pyrene	0.04 J
Phenol	2.8 J
Sodium (Dissolved)	272,000

PCE-MW-B-20191011:	10/11/2019
COMPOUND	CONC. (ug/L)
Benzo(a)Anthracene	0.12
Benzo(a)Pyrene	0.04 J
Benzo(b)Fluoranthene	0.05 J
Benzo(k)Fluoranthene	0.02 J
Chrysene	0.08 J
Sodium (Dissolved)	158,000

PCE-MW-D-20191015:	10/15/2019
COMPOUND	CONC. (ug/L)
1,2,4-Trimethylbenzene	5.7 JK
Benzene	11
Ethylbenzene	8.5 JK
M,P-Xylenes	12
O-Xylene (1,2-Dimethylbenzene)	6.1 J
Toluene	10 JK
2,4-Dimethylphenol	52 JK
Benzo(a)Anthracene	2.6
Benzo(a)Pyrene	2.4 J
Benzo(b)Fluoranthene	3.2 J
Benzo(k)Fluoranthene	1.1 J
Biphenyl (Diphenyl)	10
Chrysene	2.1
Indeno(1,2,3-c,d)Pyrene	1.5
Phenol	280 D
Iron (Dissolved)	613
Manganese (Dissolved)	304.4
Mercury (Dissolved)	5.95 JK
Sodium (Dissolved)	132,000

PCE-MW-C-20191015:	10/15/2019
COMPOUND	CONC. (ug/L)
Benzo(a)Anthracene	0.27
Benzo(a)Pyrene	0.03 J
Benzo(b)Fluoranthene	0.03 J
Benzo(k)Fluoranthene	0.02 J
Chrysene	0.02 J
Indeno(1,2,3-c,d)Pyrene	0.02 J
Iron (Dissolved)	1,530
Manganese (Dissolved)	468.7
Sodium (Dissolved)	24,600

PCE-MW-X-20191015:	10/15/2019
COMPOUND	CONC. (ug/L)
1,2,4-Trimethylbenzene	5.7 J
Benzene	11
Ethylbenzene	8.5 J
M,P-Xylenes	13
O-Xylene (1,2-Dimethylbenzene)	6.3 J
Toluene	10 J
2,4-Dimethylphenol	57 JK
Benzo(a)Anthracene	1.8
Benzo(a)Pyrene	0.94 J
Benzo(b)Fluoranthene	1.5 J
Benzo(k)Fluoranthene	0.48 J
Biphenyl (Diphenyl)	12
Chrysene	1.5
Indeno(1,2,3-c,d)Pyrene	0.69 J
Phenol	340 D
Iron (Dissolved)	643
Manganese (Dissolved)	325.2
Mercury (Dissolved)	8.43 JK
Sodium (Dissolved)	131,000

Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.

LEGEND

- BCP SITE BOUNDARY
- RESIDENTIAL BUILDING SPACE
- PARKING GARAGE (OPEN AIR)
- SIDEWALK
- GRASS PAVER
- ASPHALT
- LANDSCAPED
- NAPL RECOVERY WELL LOCATION
- GROUNDWATER MONITORING WELL LOCATION (SHALLOW LNAPL RECOVERY)

	NYSDEC AWQSGVs ug/l
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	5
Benzene	1
Ethylbenzene	5
M,P-Xylenes	5
O-Xylene (1,2-Dimethylbenzene)	5
Toluene	5
Semivolatile Organic Compounds	
2,4-Dimethylphenol	50
Benzo(a)Anthracene	0.002
Benzo(a)Pyrene	0
Benzo(b)Fluoranthene	0.002
Benzo(k)Fluoranthene	0.002
Biphenyl (Diphenyl)	5
Chrysene	0.002
Indeno(1,2,3-c,d)Pyrene	0.002
Phenol	1
Metals	
Iron	300
Manganese	300
Mercury	0.7
Sodium	20,000

Qualifier	Description
K	Reported concentration value is proportional to dilution factor and may be exaggerated
D	Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
J	The reported value is estimated

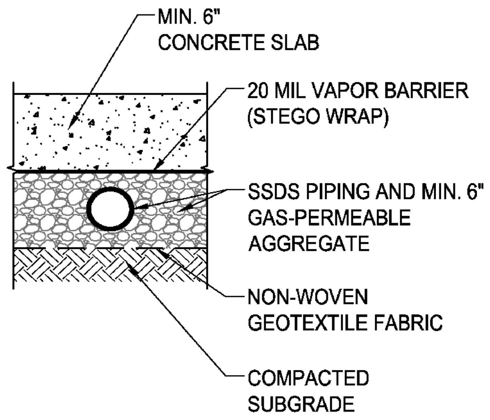
0 40 80 160
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

BASELINE GROUNDWATER MONITORING EXCEEDANCES

Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

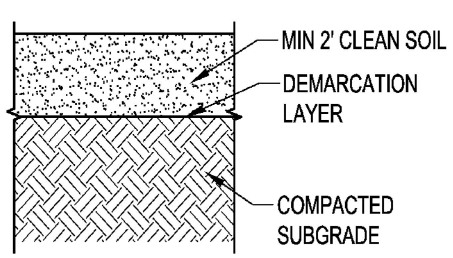
DATE 12/12/2019
PROJECT NO. 180132
FIGURE 6



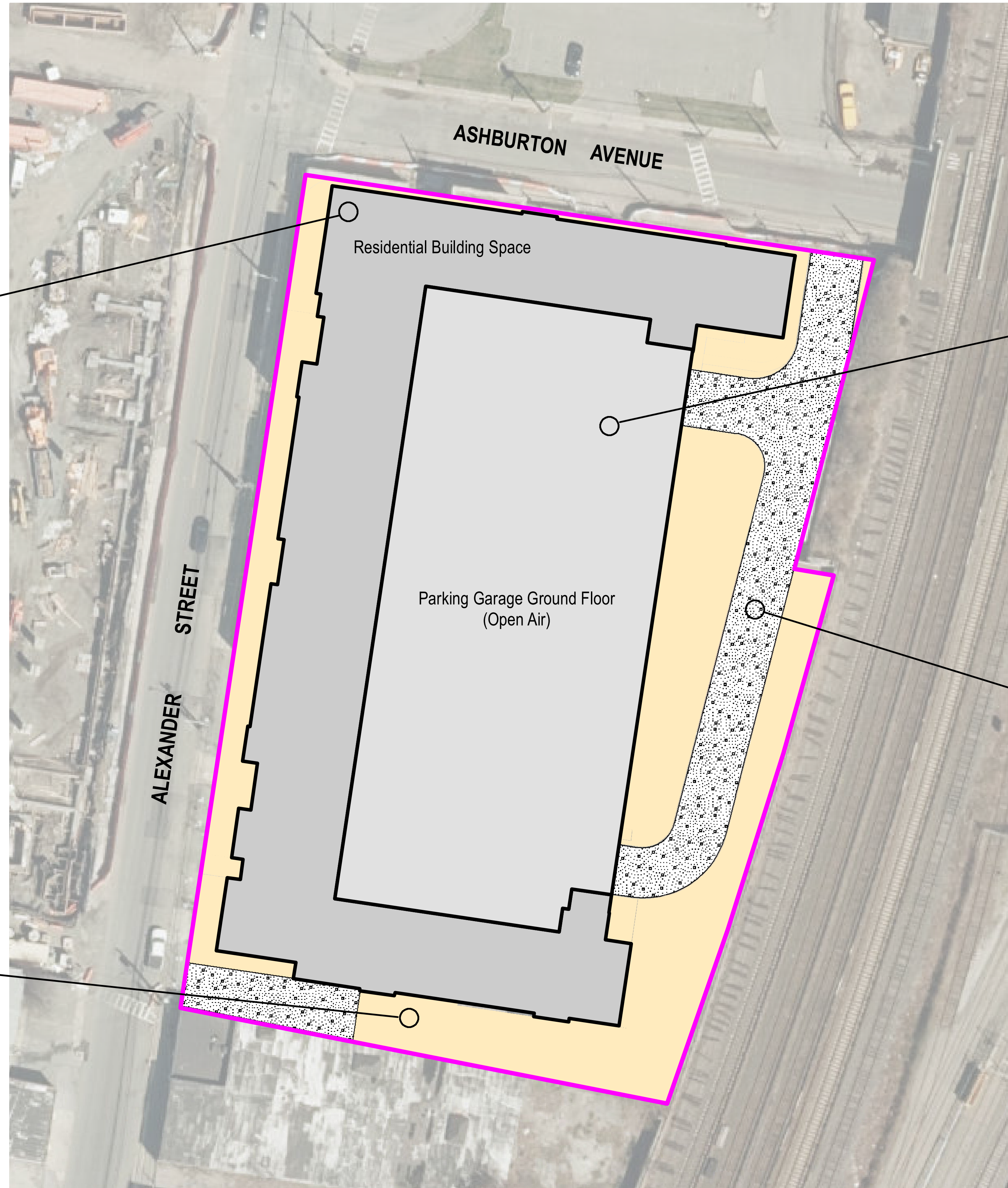
TYPICAL BUILDING SLAB
Not To Scale

NOTE:

1. SEE APPENDIX E FOR FULL SUB SLAB DEPRESSURIZATION SYSTEM (SSDS) AS-BUILT DRAWINGS.

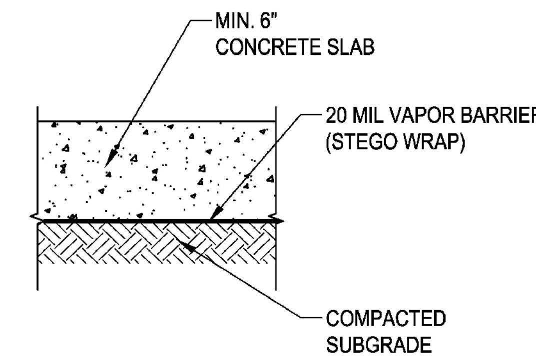


TYPICAL SOIL COVER AREA
Not To Scale

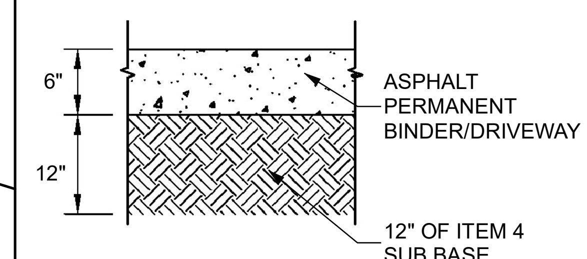


Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.



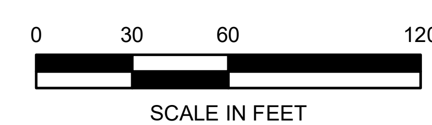
TYPICAL PARKING GARAGE SLAB
Not To Scale



TYPICAL ASPHALT/DRIVEWAY
Not To Scale

LEGEND

- BCP SITE BOUNDARY
- RESIDENTIAL BUILDING SPACE
- PARKING GARAGE (OPEN AIR)
- CURRENT ASPHALT
- SOIL COVER

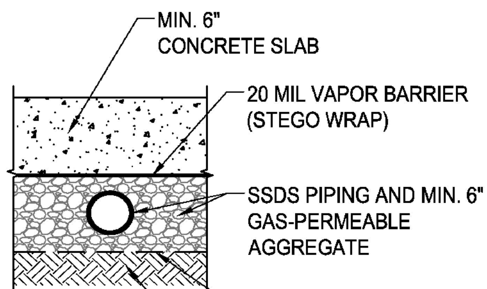


AKRF
34 S. Broadway #401, White Plains, NY 10601

Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

INTERIM COVER SYSTEM

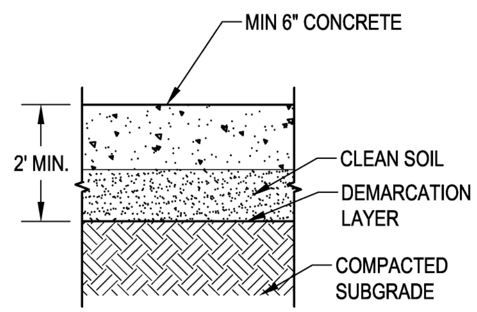
DATE
12/12/2019
PROJECT NO.
180132
FIGURE
7A



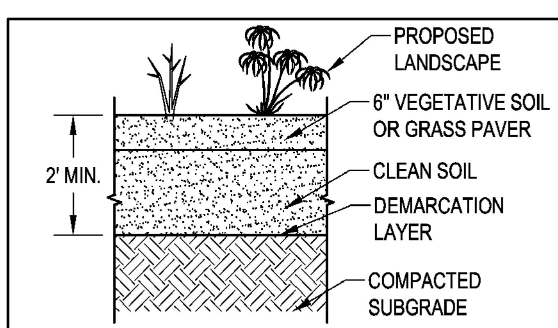
TYPICAL BUILDING SLAB
Not To Scale

NOTE:

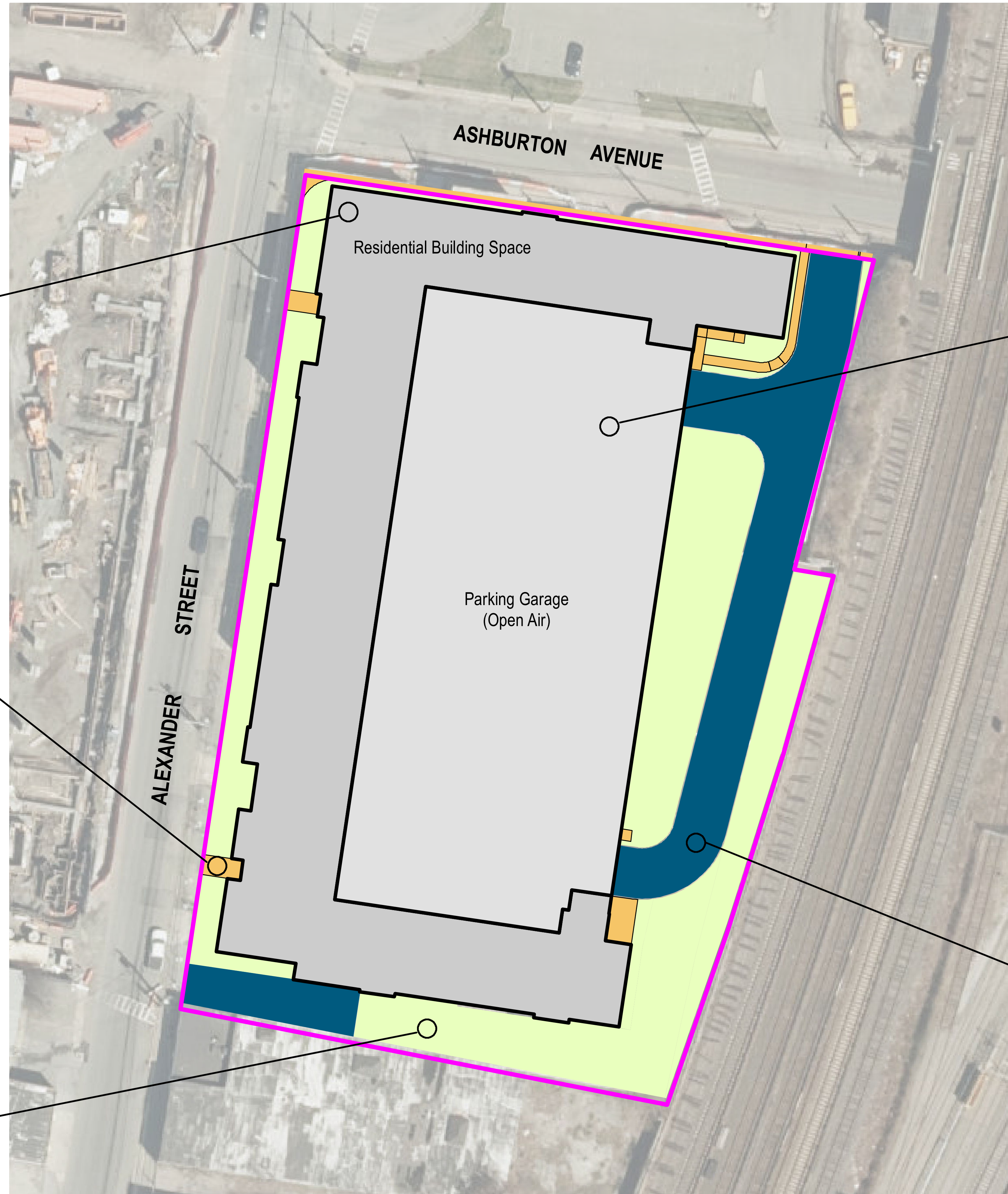
1. SEE APPENDIX E FOR FULL SUB SLAB DEPRESSURIZATION SYSTEM (SSDS) AS-BUILT DRAWINGS.



TYPICAL CONCRETE WALKWAY
Not To Scale

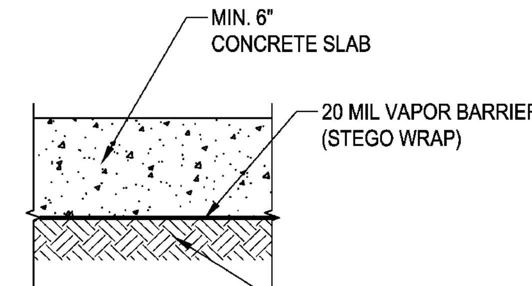


TYPICAL LANDSCAPED AREA
Not To Scale



Aerial Source:
2018 New York State ITS GIS Orthoimagery
Map Source:
BCP Site Boundary from Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. Stamped Survey Drawing Titled "Environmental Easement Area" - dated May 31, 2019.

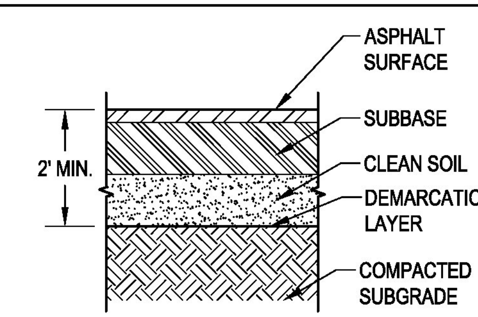
Note 1 - Building Footprint was imported from AutoCAD layers provided/completed by Paulus, Sokolowski and Sartor Architecture & Engineering, P.C. as part of the Remedial Action Workplan - May 31, 2018.



TYPICAL PARKING GARAGE SLAB
Not To Scale

LEGEND

- BCP SITE BOUNDARY
- RESIDENTIAL BUILDING SPACE
- PARKING GARAGE (OPEN AIR)
- ASPHALT
- SIDEWALK
- LANDSCAPED



TYPICAL ASPHALT SURFACE
Not To Scale

0 30 60 120
SCALE IN FEET

AKRF
440 Park Avenue South, New York, NY 10016

Polychrome East
NYSDEC Site (BCP #C360098)
Yonkers, New York

FUTURE COVER SYSTEM

DATE
12/12/2019
PROJECT NO.
180132
FIGURE
7B

TABLES

	AKRF Sample ID	EX1-B-07312018	EX1-W-07312018	EX3-E1-09132018	EX3-S1-09122018	EX3-S2-09122018	EX3-W1-09132018	EX3-W2-09132018	EX3-W3-09132018	EX4-B-08012018
	Laboratory Sample ID	L1829730-01	L1829730-02	L1836384-05	L1836198-01	L1836198-02	L1836384-06	L1836384-07	L1836384-08	L1829730-04
	Date Sampled	7/31/2018 11:00:00 AM	7/31/2018 11:05:00 AM	9/13/2018 10:50:00 AM	9/12/2018 11:20:00 AM	9/12/2018 11:25:00 AM	9/13/2018 1:10:00 PM	9/13/2018 1:15:00 PM	9/13/2018 1:20:00 PM	8/1/2018 10:00:00 AM
	Dilution Factor	1	1	1	1	1	1	1	1	2
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
1,1,1-Trichloroethane	100	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 UJ
1,1,2,2-Tetrachloroethane	NS	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
1,1,2-Trichloroethane	NS	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
1,1-Dichloroethane	26	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
1,1-Dichloroethene	100	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
1,1-Dichloropropene	NS	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
1,2,3-Trichlorobenzene	NS	NA	NA	0.13 UJ	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,2,3-Trichloropropane	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,2,4,5-Tetramethylbenzene	NS	NA	NA	0.036 J	0.02 J	0.018 J	2 J	0.022 J	0.1 J	2.8 J
1,2,4-Trichlorobenzene	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,2,4-Trimethylbenzene	52	NA	NA	0.065 J	0.12 U	0.065 J	0.072 J	0.19 U	0.067 J	0.2 J
1,2-Dibromo-3-Chloropropane	NS	NA	NA	0.19 U	0.19 U	0.17 U	0.19 U	0.28 U	0.18 U	0.33 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
1,2-Dichlorobenzene	100	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,2-Dichloroethane	3.1	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.029 J	0.11 UJ
1,2-Dichloropropane	NS	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
1,3,5-Trimethylbenzene (Mesitylene)	52	NA	NA	0.034 J	0.12 U	0.042 J	0.03 J	0.038 J	0.075 J	0.056 J
1,3-Dichlorobenzene	49	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,3-Dichloropropane	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,4-Dichlorobenzene	13	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
1,4-Diethyl Benzene	NS	NA	NA	0.046 J	0.12 U	0.033 J	0.77 J	0.19 U	0.052 J	0.036 J
2,2-Dichloropropane	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 UJ
2-Chlorotoluene	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
2-Hexanone	NS	NA	NA	0.64 U	0.62 U	0.57 U	0.64 U	0.93 U	0.59 U	1.1 U
4-Chlorotoluene	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
4-Ethyltoluene	NS	NA	NA	0.059 J	0.12 U	0.078 J	0.07 J	0.19 U	0.073 J	0.11 J
Acetone	100	NA	NA	0.64 U	0.62 U	0.57 U	0.64 U	0.93 U	0.59 U	1.1 U
Acrylonitrile	NS	NA	NA	0.26 U	0.25 UJ	0.23 UJ	0.26 U	0.37 U	0.24 U	0.44 U
Benzene	4.8	NA	NA	0.022 J	0.031 U	0.073 J	0.012 J	0.37	0.076 J	0.032 J
Bromobenzene	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
Bromochloromethane	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 UJ
Bromodichloromethane	NS	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 UJ
Bromoform	NS	NA	NA	0.26 U	0.25 U	0.23 U	0.26 U	0.37 U	0.24 U	0.44 U
Bromomethane	NS	NA	NA	0.13 UJ	0.12 U	0.11 U	0.048 J	0.072 J	0.048 J	0.22 UJ
Carbon Disulfide	NS	NA	NA	0.64 U	0.62 U	0.57 U	0.64 U	0.93 U	0.59 U	1.1 U
Carbon Tetrachloride	2.4	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 UJ
Chlorobenzene	100	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
Chloroethane	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
Chloroform	49	NA	NA	0.097 U	0.093 U	0.086 U	0.096 U	0.14 U	0.088 U	0.16 U
Chloromethane	NS	NA	NA	0.26 U	0.25 U	0.23 U	0.26 U	0.37 U	0.24 U	0.44 U
Cis-1,2-Dichloroethylene	100	NA	NA	0.035 J	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
Cis-1,3-Dichloropropene	NS	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
Cymene	NS	NA	NA	0.011 J	0.062 U	0.044 J	0.17 J	0.093 U	0.066 J	0.11 U
Dibromochloromethane	NS	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
Dibromomethane	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 UJ
Dichlorodifluoromethane	NS	NA	NA	0.64 U	0.62 U	0.57 U	0.64 U	0.93 U	0.59 U	1.1 U
Dichloroethylenes	NS	NA	NA	0.035 J	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
Diethyl Ether (Ethyl Ether)	NS	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.2 J
Ethylbenzene	41	NA	NA	0.047 J	0.062 U	0.038 J	0.064 U	0.016 J	0.054 J	0.045 J
Isopropylbenzene (Cumene)	NS	NA	NA	0.017 J	0.011 J	0.1 J	0.82 J	0.052 J	0.12 J	0.2 J
M,P-Xylenes	NS	NA	NA	0.086 J	0.12 U	0.14 J	0.045 J	0.19 U	0.16 J	0.35 J
Methyl Ethyl Ketone (2-Butanone)	100	NA	NA	0.64 U	0.62 U	0.57 U	0.64 U	0.93 U	0.59 U	1.1 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	NA	NA	0.64 U	0.62 U	0.57 U	0.64 U	0.93 U	0.59 U	1.1 U
Methylene Chloride	100	NA	NA	0.32 U	0.31 U	0.28 U	0.32 U	0.47 U	0.29 U	0.55 U
N-Butylbenzene	100	NA	NA	0.018 J	0.062 U	0.057 U	0.53 J	0.093 U	0.059 U	0.18 J
N-Propylbenzene	100	NA	NA	0.025 J	0.062 U	0.031 J	0.48 J	0.093 U	0.06 J	0.14 J
O-Xylene (1,2-Dimethylbenzene)	NS	NA	NA	0.028 J	0.062 U	0.054 J	0.043 J	0.093 U	0.026 J	0.11 U
Sec-Butylbenzene	100	NA	NA	0.026 J	0.014 J	0.059 J	1.2 J	0.021 J	0.25 J	0.65 J
Styrene	NS	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
T-Butylbenzene	100	NA	NA	0.13 U	0.01 J	0.057 J	0.31 J	0.11 J	0.16 J	0.18 J
Tert-Butyl Methyl Ether	100	NA	NA	0.13 U	0.12 U	0.11 U	0.13 U	0.19 U	0.12 U	0.22 U
Tetrachloroethylene (PCE)	19	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
Toluene	100	NA	NA	0.064 U	0.062 U	0.071 J	0.064 U	0.064 J	0.039 J	0.061 J
Total, 1,3-Dichloropropene (Cis And Trans)	NS	NA	NA	0.032 U	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 U
Trans-1,2-Dichloroethene	100	NA	NA	0.097 U	0.093 U	0.086 U	0.096 U	0.14 U	0.088 U	0.16 U
Trans-1,3-Dichloropropene	NS	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
Trans-1,4-Dichloro-2-Butene	NS	NA	NA	0.32 U	0.31 U	0.28 U	0.32 U	0.47 U	0.29 U	0.55 U
Trichloroethylene (TCE)	21	0.075	0.064	0.52	0.031 U	0.028 U	0.032 U	0.047 U	0.029 U	0.055 UJ
Trichlorofluoromethane	NS	NA	NA	0.26 U	0.25 U	0.23 U	0.26 U	0.37 U	0.24 U	0.44 UJ
Vinyl Acetate	NS	NA	NA	0.64 U	0.62 UJ	0.57 UJ	0.64 U	0.93 U	0.59 U	1.1 U
Vinyl Chloride	0.9	NA	NA	0.064 U	0.062 U	0.057 U	0.064 U	0.093 U	0.059 U	0.11 U
Xylenes, Total	100	NA	NA	0.11 J	0.062 U	0.19 J	0.088 J	0.093 U	0.19 J	0.35 J

Table 1A
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
VOCs

	AKRF Sample ID	EX4-E1-09102018	EX4-E2-09112018	EX4-N1-09112018	EX4-N2-09112018	EX4-S1-09102018	EX4-S2-09102018	EX5-B-07302018	EX5-E-07302018
	Laboratory Sample ID	L1835749-03	L1836132-09	L1836132-07	L1836132-08	L1835749-01	L1835749-02	L1829306-04	L1829306-02
	Date Sampled	9/10/2018 12:50:00 PM	9/11/2018 12:30:00 PM	9/11/2018 12:20:00 PM	9/11/2018 12:25:00 PM	9/10/2018 1:15:00 PM	9/10/2018 11:30:00 AM	7/30/2018 12:15:00 PM	7/30/2018 12:05:00 PM
	Dilution Factor	1	1	1	1	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	2.5 U	0.00073 U
1,1,1-Trichloroethane	100	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	2.5 U	0.00073 U
1,1,2,2-Tetrachloroethane	NS	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	0.5 U	0.00073 U
1,1,2-Trichloroethane	NS	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	1.5 U	0.0015 U
1,1-Dichloroethane	26	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	2.5 U	0.0015 U
1,1-Dichloroethene	100	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	0.5 U	0.0015 U
1,1-Dichloropropene	NS	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	2.5 U	0.00073 U
1,2,3-Trichlorobenzene	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 UJ	0.0029 U
1,2,3-Trichloropropane	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 UJ
1,2,4,5-Tetramethylbenzene	NS	0.13 J	0.0018 UJ	0.085 J	0.38 J	0.085 J	0.00032 J	2 U	0.0029 U
1,2,4-Trichlorobenzene	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
1,2,4-Trimethylbenzene	52	0.79	0.0018 U	0.017 J	0.12 J	0.15 U	0.0024 U	2.5 U	0.0029 U
1,2-Dibromo-3-Chloropropane	NS	0.32 U	0.0027 U	0.13 U	0.16 U	0.23 U	0.0036 U	2.5 U	0.0044 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	2 U	0.0015 U
1,2-Dichlorobenzene	100	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
1,2-Dichloroethane	3.1	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	0.5 U	0.0015 U
1,2-Dichloropropane	NS	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	1 U	0.0015 U
1,3,5-Trimethylbenzene (Mesitylene)	52	0.54	0.0018 U	0.088 U	0.047 J	0.15 U	0.0024 U	2.5 U	0.0029 U
1,3-Dichlorobenzene	49	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
1,3-Dichloropropane	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
1,4-Dichlorobenzene	13	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
1,4-Diethyl Benzene	NS	0.21	0.0018 U	0.04 J	0.11 J	0.15 U	0.0024 U	2 U	0.0029 U
2,2-Dichloropropane	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
2-Chlorotoluene	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
2-Hexanone	NS	1.1 U	0.009 U	0.44 U	0.53 U	0.76 U	0.012 U	5 U	0.015 U
4-Chlorotoluene	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
4-Ethyltoluene	NS	0.78	0.0018 U	0.088 U	0.074 J	0.15 U	0.0024 U	2 U	0.0029 U
Acetone	100	1.1 U	0.026	0.44 U	0.53 U	0.76 U	0.068	13	0.02
Acrylonitrile	NS	0.42 UJ	0.0036 U	0.18 U	0.21 U	0.3 UJ	0.0048 UJ	5 U	0.0058 U
Benzene	4.8	0.07	0.00045 U	0.022 U	0.02 J	0.038 U	0.00054 J	0.5 U	0.00073 U
Bromobenzene	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
Bromochloromethane	NS	0.21 U	0.0018 UJ	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
Bromodichloromethane	NS	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	0.5 U	0.00073 U
Bromoform	NS	0.42 U	0.0036 U	0.18 U	0.21 U	0.3 U	0.0048 U	2 U	0.0058 U
Bromomethane	NS	0.21 U	0.0018 UJ	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 UJ
Carbon Disulfide	NS	1.1 U	0.009 U	0.44 U	0.53 U	0.76 U	0.012 U	5 U	0.015 U
Carbon Tetrachloride	2.4	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	0.5 U	0.0015 U
Chlorobenzene	100	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	2.5 U	0.00073 U
Chloroethane	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
Chloroform	49	0.16 U	0.0014 U	0.066 U	0.079 U	0.11 U	0.0018 U	2.5 U	0.0022 U
Chloromethane	NS	0.42 U	0.0036 U	0.18 U	0.21 U	0.3 U	0.0048 U	2.5 U	0.0058 U
Cis-1,2-Dichloroethylene	100	0.12	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	2.5 U	0.0015 U
Cis-1,3-Dichloropropene	NS	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	0.5 U	0.00073 U
Cymene	NS	0.12	0.0009 U	0.006 J	0.025 J	0.076 U	0.0012 U	2.5 U	0.0015 U
Dibromochloromethane	NS	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	0.5 U	0.0015 U
Dibromomethane	NS	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	5 U	0.0029 U
Dichlorodifluoromethane	NS	1.1 U	0.009 UJ	0.44 U	0.53 U	0.76 U	0.012 U	5 U	0.015 U
Dichloroethylenes	NS	0.22 J	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	2.5 U	0.0015 U
Diethyl Ether (Ethyl Ether)	NS	0.071 J	0.0018 U	0.088 U	0.1 U	0.15 U	0.00079 J	0.78 J	0.0029 U
Ethylbenzene	41	0.46	0.0009 U	0.044 U	0.018 J	0.076 U	0.00033 J	2.5 U	0.0015 U
Isopropylbenzene (Cumene)	NS	0.22	0.0009 U	0.044 U	0.021 J	0.016 J	0.00035 J	2.5 U	0.0015 U
M,P-Xylenes	NS	1.8	0.0018 U	0.088 U	0.093 J	0.15 U	0.0024 U	2.5 U	0.0029 U
Methyl Ethyl Ketone (2-Butanone)	100	1.1 U	0.009 UJ	0.44 U	0.53 U	0.76 U	0.014	5.2	0.015 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	3.6	0.009 U	0.44 U	0.53 U	0.76 U	0.012 U	5 U	0.015 UJ
Methylene Chloride	100	0.53 U	0.0045 U	0.22 U	0.26 U	0.38 U	0.006 U	2.5 U	0.0073 U
N-Butylbenzene	100	0.17	0.0009 U	0.044 U	0.053 U	0.013 J	0.0012 U	2.5 U	0.0015 U
N-Propylbenzene	100	0.32	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	2.5 U	0.0015 U
O-Xylene (1,2-Dimethylbenzene)	NS	0.59	0.0009 U	0.044 U	0.034 J	0.076 U	0.0012 U	2.5 U	0.0015 U
Sec-Butylbenzene	100	0.19	0.0009 U	0.012 J	0.053 J	0.035 J	0.00085 J	2.5 U	0.0015 U
Styrene	NS	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	2.5 U	0.0015 U
T-Butylbenzene	100	0.28	0.0018 U	0.088 U	0.019 J	0.032 J	0.00083 J	2.5 U	0.0029 U
Tert-Butyl Methyl Ether	100	0.21 U	0.0018 U	0.088 U	0.1 U	0.15 U	0.0024 U	2.5 U	0.0029 U
Tetrachloroethylene (PCE)	19	0.053 U	0.00045 U	0.01 J	0.026 U	0.038 U	0.0006 U	0.5 U	0.00073 U
Toluene	100	5.3	0.0009 U	0.044 U	0.051 J	0.076 U	0.0012 U	2.5 U	0.0015 U
Total, 1,3-Dichloropropene (Cis And Trans)	NS	0.053 U	0.00045 U	0.022 U	0.026 U	0.038 U	0.0006 U	0.5 U	0.00073 U
Trans-1,2-Dichloroethene	100	0.099 J	0.0014 U	0.066 U	0.079 U	0.11 U	0.0018 U	2.5 U	0.0022 U
Trans-1,3-Dichloropropene	NS	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	0.5 U	0.0015 U
Trans-1,4-Dichloro-2-Butene	NS	0.53 U	0.0045 UJ	0.22 U	0.26 U	0.38 U	0.006 U	2.5 U	0.0073 UJ
Trichloroethylene (TCE)	21	0.39	0.00045 U	0.015 J	0.025 J	0.038 U	0.0006 U	0.5 U	0.00073 U
Trichlorofluoromethane	NS	0.42 U	0.0036 U	0.18 U	0.21 U	0.3 U	0.0048 U	2.5 U	0.0058 U
Vinyl Acetate	NS	1.1 UJ	0.009 U	0.44 UJ	0.53 UJ	0.76 UJ	0.012 UJ	5 U	0.015 U
Vinyl Chloride	0.9	0.11 U	0.0009 U	0.044 U	0.053 U	0.076 U	0.0012 U	1 U	0.0015 U
Xylenes, Total	100	2.4	0.0009 U	0.044 U	0.13 J	0.076 U	0.0012 U	2.5 U	0.0015 U

Table 1A
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
VOCs

	AKRF Sample ID	EX5-N-07302018	EX5-W-07302018	EX6-B-07302018	EX6-N-07302018	EXA-S-08022018	EXA-W-08022018	EXB-E1-09132018	EXB-E2-09132018
	Laboratory Sample ID	L1829306-01	L1829306-03	L1829306-06	L1829306-05	L1830132-01	L1830132-02	L1836384-03	L1836384-04
	Date Sampled	7/30/2018 12:00:00 PM	7/30/2018 12:10:00 PM	7/30/2018 12:35:00 PM	7/30/2018 12:30:00 PM	8/2/2018 11:05:00 AM	8/2/2018 11:05:00 AM	9/13/2018 10:40:00 AM	9/13/2018 10:45:00 AM
	Dilution Factor	1	1	1	1	1	4	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
1,1,1-Trichloroethane	100	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
1,1,2,2-Tetrachloroethane	NS	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
1,1,2-Trichloroethane	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
1,1-Dichloroethane	26	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
1,1-Dichloroethene	100	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
1,1-Dichloropropene	NS	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
1,2,3-Trichlorobenzene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 UJ	0.16 UJ
1,2,3-Trichloropropane	NS	0.0026 UJ	0.0042 UJ	0.0023 UJ	0.0023 UJ	0.24 U	0.28 J	0.0018 U	0.16 U
1,2,4,5-Tetramethylbenzene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	9.6	0.013	0.05 J
1,2,4-Trichlorobenzene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
1,2,4-Trimethylbenzene	52	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.052 J	11	0.00033 J	0.067 J
1,2-Dibromo-3-Chloropropane	NS	0.0038 U	0.0063 U	0.0035 U	0.0035 U	0.36 U	1.1 U	0.0027 U	0.25 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
1,2-Dichlorobenzene	100	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
1,2-Dichloroethane	3.1	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
1,2-Dichloropropane	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
1,3,5-Trimethylbenzene (Mesitylene)	52	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.04 J	4	0.0018 U	0.031 J
1,3-Dichlorobenzene	49	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
1,3-Dichloropropane	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
1,4-Dichlorobenzene	13	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
1,4-Diethyl Benzene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	3.3	0.0038	0.047 J
2,2-Dichloropropane	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
2-Chlorotoluene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
2-Hexanone	NS	0.013 U	0.021 U	0.012 U	0.012 U	1.2 U	3.7 U	0.009 U	0.82 U
4-Chlorotoluene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
4-Ethyltoluene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	9.9	0.00034 J	0.068 J
Acetone	100	0.029	0.16	0.019	0.018	1.2 U	3.7 U	0.021	0.82 U
Acrylonitrile	NS	0.0051 U	0.0084 U	0.0047 U	0.0046 U	0.48 U	1.5 U	0.0036 U	0.33 U
Benzene	4.8	0.00064 U	0.00049 J	0.00042 J	0.00022 J	0.024 J	0.57	0.00045 U	0.017 J
Bromobenzene	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
Bromochloromethane	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
Bromodichloromethane	NS	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
Bromoform	NS	0.0051 U	0.0084 U	0.0047 U	0.0046 U	0.48 U	1.5 U	0.0036 U	0.33 U
Bromomethane	NS	0.0026 UJ	0.0042 UJ	0.0023 UJ	0.0023 UJ	0.24 UJ	0.74 UJ	0.0018 UJ	0.16 UJ
Carbon Disulfide	NS	0.013 U	0.021 U	0.012 U	0.012 U	1.2 U	3.7 U	0.009 U	0.82 U
Carbon Tetrachloride	2.4	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
Chlorobenzene	100	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
Chloroethane	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 UJ	0.74 UJ	0.0018 U	0.16 U
Chloroform	49	0.0019 U	0.0032 U	0.0018 U	0.0017 U	0.18 U	0.55 U	0.0013 U	0.12 U
Chloromethane	NS	0.0051 U	0.0084 U	0.0047 U	0.0046 U	0.48 U	1.5 U	0.0036 U	0.33 U
Cis-1,2-Dichloroethylene	100	0.0013 U	0.0011 J	0.0012 U	0.0012 U	0.27	0.37 U	0.0009 U	0.11
Cis-1,3-Dichloropropene	NS	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
Cymene	NS	0.0013 U	0.00036 J	0.0012 U	0.0012 U	0.12 U	0.53	0.0009 U	0.082 U
Dibromochloromethane	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
Dibromomethane	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
Dichlorodifluoromethane	NS	0.013 U	0.021 U	0.012 U	0.012 U	1.2 U	3.7 U	0.009 U	0.82 U
Dichloroethylenes	NS	0.0013 U	0.0011 J	0.0012 U	0.0012 U	0.27	0.37 U	0.0009 U	0.11
Diethyl Ether (Ethyl Ether)	NS	0.0015 J	0.0042 U	0.0023 U	0.0023 U	0.041 J	0.74 U	0.0018 U	0.16 U
Ethylbenzene	41	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.046 J	12	0.00062 J	0.07 J
Isopropylbenzene (Cumene)	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	2.5	0.006	0.014 J
M,P-Xylenes	NS	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.19 J	12	0.00061 J	0.088 J
Methyl Ethyl Ketone (2-Butanone)	100	0.0064 J	0.016 J	0.0039 J	0.0043 J	1.2 U	3.7 U	0.009 U	0.82 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	0.013 UJ	0.021 UJ	0.012 UJ	0.012 UJ	1.2 U	3.7 U	0.009 U	0.82 U
Methylene Chloride	100	0.0064 U	0.01 U	0.0058 U	0.0058 U	0.59 U	1.8 U	0.0045 U	0.41 U
N-Butylbenzene	100	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	2.4	0.0032	0.017 J
N-Propylbenzene	100	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	5.6	0.0036	0.022 J
O-Xylene (1,2-Dimethylbenzene)	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.048 J	4.8	0.00029 J	0.038 J
Sec-Butylbenzene	100	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	1.8	0.0094	0.014 J
Styrene	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
T-Butylbenzene	100	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.17 J	0.00082 J	0.16 U
Tert-Butyl Methyl Ether	100	0.0026 U	0.0042 U	0.0023 U	0.0023 U	0.24 U	0.74 U	0.0018 U	0.16 U
Tetrachloroethylene (PCE)	19	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
Toluene	100	0.0013 U	0.0031	0.0012 U	0.0012 U	0.28	2.2	0.0009 U	0.082 U
Total, 1,3-Dichloropropene (Cis And Trans)	NS	0.00064 U	0.001 U	0.00058 U	0.00058 U	0.059 U	0.18 U	0.00045 U	0.041 U
Trans-1,2-Dichloroethene	100	0.0019 U	0.0032 U	0.0018 U	0.0017 U	0.18 U	0.55 U	0.0013 U	0.12 U
Trans-1,3-Dichloropropene	NS	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
Trans-1,4-Dichloro-2-Butene	NS	0.0064 UJ	0.01 UJ	0.0058 UJ	0.0058 UJ	0.59 U	1.8 U	0.0045 U	0.41 U
Trichloroethylene (TCE)	21	0.00064 U	0.0004 J	0.00058 U	0.00058 U	4.2	0.18 U	0.00045 U	0.55
Trichlorofluoromethane	NS	0.0051 U	0.0084 U	0.0047 U	0.0046 U	0.48 UJ	1.5 UJ	0.0036 U	0.33 U
Vinyl Acetate	NS	0.013 U	0.021 U	0.012 U	0.012 U	1.2 U	3.7 U	0.009 U	0.82 U
Vinyl Chloride	0.9	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.12 U	0.37 U	0.0009 U	0.082 U
Xylenes, Total	100	0.0013 U	0.0021 U	0.0012 U	0.0012 U	0.24 J	17	0.0009 J	0.13 J

	AKRF Sample ID	EXB-N-08012018	EXB-N1-09042018	EXB-N2-09132018	EXB-W1-09042018	EXB-W2-09132018	EXC-B-09112018	EXC-E-09112018	EXC-N-09112018
	Laboratory Sample ID	L1829730-03	L1834890-01	L1836384-01	L1834890-03	L1836384-02	L1836132-01	L1836132-04	L1836132-02
	Date Sampled	8/1/2018 11:00:00 AM	9/4/2018 1:30:00 PM	9/13/2018 1:00:00 PM	9/4/2018 2:30:00 PM	9/13/2018 1:05:00 PM	9/11/2018 10:20:00 AM	9/11/2018 10:10:00 AM	9/11/2018 10:00:00 AM
	Dilution Factor	2.5	10	1	5	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	2.5 U	0.00053 U	0.028 U
1,1,1-Trichloroethane	100	0.073 UJ	0.6 U	0.028 U	0.15 U	0.03 U	2.5 U	0.00053 U	0.028 U
1,1,2,2-Tetrachloroethane	NS	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	0.5 U	0.00053 U	0.028 U
1,1,2-Trichloroethane	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	1.5 U	0.001 U	0.057 U
1,1-Dichloroethane	26	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	2.5 U	0.001 U	0.057 U
1,1-Dichloroethene	100	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	0.5 U	0.001 U	0.057 U
1,1-Dichloropropene	NS	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	2.5 U	0.00053 U	0.028 U
1,2,3-Trichlorobenzene	NS	0.29 U	2.4 U	0.11 UJ	0.59 U	0.12 UJ	2.5 UJ	0.0021 U	0.11 U
1,2,3-Trichloropropane	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
1,2,4,5-Tetramethylbenzene	NS	2.4	33 J	0.61	13	0.03 J	2.3	0.0021 UJ	0.11 U
1,2,4-Trichlorobenzene	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
1,2,4-Trimethylbenzene	52	0.29 U	2.4 U	0.11 U	1.1 J	0.12 U	2.5 U	0.0021 U	0.48
1,2-Dibromo-3-Chloropropane	NS	0.44 U	3.6 U	0.16 U	0.88 U	0.18 U	2.5 U	0.0032 U	0.17 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	2 U	0.001 U	0.057 U
1,2-Dichlorobenzene	100	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
1,2-Dichloroethane	3.1	0.14 UJ	1.2 U	0.055 U	0.3 U	0.06 U	0.5 U	0.001 U	0.057 U
1,2-Dichloropropane	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	1 U	0.001 U	0.057 U
1,3,5-Trimethylbenzene (Mesitylene)	52	0.29 U	2.4 U	0.11 U	0.46 J	0.12 U	2.5 U	0.0021 U	0.53
1,3-Dichlorobenzene	49	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
1,3-Dichloropropane	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
1,4-Dichlorobenzene	13	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
1,4-Diethyl Benzene	NS	0.56	5.4 J	0.072 J	1.2 J	0.12 U	2 U	0.0021 U	0.24
2,2-Dichloropropane	NS	0.29 UJ	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 UJ
2-Chlorotoluene	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
2-Hexanone	NS	1.4 U	12 U	0.55 U	3 U	0.6 U	5 U	0.01 U	0.57 U
4-Chlorotoluene	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
4-Ethyltoluene	NS	0.29 U	2.4 U	0.11 U	0.47 J	0.12 U	2 U	0.0021 U	0.3
Acetone	100	1.4 U	12 U	0.55 U	3 U	0.6 U	39	0.01 U	0.57 U
Acrylonitrile	NS	0.58 U	4.8 U	0.22 U	1.2 U	0.24 U	5 U	0.0042 U	0.23 U
Benzene	4.8	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	0.22 J	0.00023 J	0.028 U
Bromobenzene	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
Bromochloromethane	NS	0.29 UJ	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 UJ	0.11 U
Bromodichloromethane	NS	0.073 UJ	0.6 U	0.028 U	0.15 U	0.03 U	0.5 U	0.00053 U	0.028 U
Bromoform	NS	0.58 U	4.8 U	0.22 U	1.2 U	0.24 U	2 U	0.0042 U	0.23 U
Bromomethane	NS	0.29 UJ	2.4 UJ	0.11 UJ	0.59 U	0.12 UJ	2.5 U	0.0021 UJ	0.11 U
Carbon Disulfide	NS	1.4 U	12 U	0.55 U	3 U	0.6 U	5 U	0.01 U	0.57 U
Carbon Tetrachloride	2.4	0.14 UJ	1.2 U	0.055 U	0.3 U	0.06 U	0.5 U	0.001 U	0.057 U
Chlorobenzene	100	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	2.5 U	0.00053 U	0.028 U
Chloroethane	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
Chloroform	49	0.22 U	1.8 U	0.083 U	0.44 U	0.09 U	2.5 U	0.00015 J	0.016 J
Chloromethane	NS	0.58 U	4.8 U	0.22 U	1.2 U	0.24 U	2.5 U	0.0042 U	0.23 U
Cis-1,2-Dichloroethylene	100	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	0.75 J	0.001 U	0.55
Cis-1,3-Dichloropropene	NS	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	0.5 U	0.00053 U	0.028 U
Cymene	NS	0.14 U	1.2 U	0.055 U	0.094 J	0.06 U	2.5 U	0.001 U	0.023 J
Dibromochloromethane	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	0.5 U	0.001 U	0.057 U
Dibromomethane	NS	0.29 UJ	2.4 U	0.11 U	0.59 U	0.12 U	5 U	0.0021 U	0.11 U
Dichlorodifluoromethane	NS	1.4 U	12 U	0.55 U	3 U	0.6 U	5 U	0.01 UJ	0.57 U
Dichloroethylenes	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	0.75 J	0.001 U	0.57 J
Diethyl Ether (Ethyl Ether)	NS	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	1 J	0.0021 U	0.11 U
Ethylbenzene	41	0.14 U	1.2 U	0.011 J	0.2 J	0.06 U	2.5 U	0.001 U	0.2
Isopropylbenzene (Cumene)	NS	0.52	8.6 J	0.051 J	3 J	0.029 J	2.5 U	0.001 U	0.068
M,P-Xylenes	NS	0.29 U	2.4 U	0.11 U	0.52 J	0.12 U	2.5 U	0.0021 U	1.2
Methyl Ethyl Ketone (2-Butanone)	100	1.4 U	12 U	0.55 U	3 U	0.6 U	3.7 J	0.01 UJ	0.57 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	1.4 U	12 U	0.55 U	3 U	0.6 U	1.3 J	0.01 U	0.38 J
Methylene Chloride	100	0.73 U	6 U	0.28 U	1.5 U	0.3 U	2.5 U	0.0053 U	0.28 U
N-Butylbenzene	100	0.89	12 J	0.036 J	5 J	0.011 J	2.5 U	0.001 U	0.018 J
N-Propylbenzene	100	0.61	8.9 J	0.018 J	4.4 J	0.026 J	2.5 U	0.001 U	0.12
O-Xylene (1,2-Dimethylbenzene)	NS	0.14 U	1.2 U	0.055 U	0.13 J	0.06 U	2.5 U	0.001 U	0.4
Sec-Butylbenzene	100	1.3	16 J	0.28	6 J	0.022 J	2.5 U	0.001 U	0.033 J
Styrene	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	2.5 U	0.001 U	0.057 U
T-Butylbenzene	100	0.069 J	1.3 J	0.025 J	0.41 J	0.12 U	1.1 J	0.0021 U	0.079 J
Tert-Butyl Methyl Ether	100	0.29 U	2.4 U	0.11 U	0.59 U	0.12 U	2.5 U	0.0021 U	0.11 U
Tetrachloroethylene (PCE)	19	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	0.5 U	0.00053 U	0.032
Toluene	100	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	2.5 U	0.001 U	0.18
Total, 1,3-Dichloropropene (Cis And Trans)	NS	0.073 U	0.6 U	0.028 U	0.15 U	0.03 U	0.5 U	0.00053 U	0.028 U
Trans-1,2-Dichloroethene	100	0.22 U	1.8 U	0.083 U	0.44 U	0.09 U	2.5 U	0.0016 U	0.021 J
Trans-1,3-Dichloropropene	NS	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	0.5 U	0.001 U	0.057 U
Trans-1,4-Dichloro-2-Butene	NS	0.73 U	6 U	0.28 U	1.5 U	0.3 U	2.5 U	0.0053 UJ	0.28 U
Trichloroethylene (TCE)	21	0.073 UJ	0.6 U	0.028 U	0.15 U	0.03 U	1	0.00045 J	1.9
Trichlorofluoromethane	NS	0.58 U	4.8 U	0.22 U	1.2 U	0.24 U	2.5 U	0.0042 U	0.23 U
Vinyl Acetate	NS	1.4 U	12 U	0.55 U	3 U	0.6 U	5 U	0.01 U	0.57 UJ
Vinyl Chloride	0.9	0.14 U	1.2 U	0.055 U	0.3 U	0.06 U	0.16 J	0.001 U	0.057 U
Xylenes, Total	100	0.14 U	1.2 U	0.055 U	0.65 J	0.06 U	2.5 U	0.001 U	1.6

	AKRF Sample ID	EXC-S-09112018	EXC-W-09112018	EXD-B-09052018	EXD-E1-09052018	EXD-E2-09052018	EXD-N1-09062018	EXD-S1-09052018	EXD-DUP-09052018
	Laboratory Sample ID	L1836132-03	L1836132-05	L1835198-06	L1835198-01	L1835198-02	L1835198-08	L1835198-03	L1835198-05
	Date Sampled	9/11/2018 10:05:00 AM	9/11/2018 10:15:00 AM	9/5/2018 2:05:00 PM	9/5/2018 1:45:00 PM	9/5/2018 1:50:00 PM	9/6/2018 8:20:00 AM	9/5/2018 1:55:00 PM	9/5/2018 2:00:00 PM
	Dilution Factor	1	1	1	1	1	1	1	1
	Unit	mg/kg	mg/kg	ug/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	0.00056 U	0.00047 U	2.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 U
1,1,1-Trichloroethane	100	0.00056 U	0.00047 U	2.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 U
1,1,2,2-Tetrachloroethane	NS	0.00056 U	0.00047 U	0.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 U
1,1,2-Trichloroethane	NS	0.0011 U	0.00095 U	1.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
1,1-Dichloroethane	26	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
1,1-Dichloroethene	100	0.0011 U	0.00095 U	0.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
1,1-Dichloropropene	NS	0.00056 U	0.00047 U	2.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 U
1,2,3-Trichlorobenzene	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 UJ	0.0024 U	0.0028 UJ
1,2,3-Trichloropropane	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
1,2,4,5-Tetramethylbenzene	NS	0.0022 UJ	0.0019 U	2 U	0.002 U	0.0032 U	0.0023 UJ	0.0024 U	0.0028 UJ
1,2,4-Trichlorobenzene	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 UJ	0.0024 U	0.0028 UJ
1,2,4-Trimethylbenzene	52	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.058 J	0.0024 U	0.0028 UJ
1,2-Dibromo-3-Chloropropane	NS	0.0033 U	0.0028 U	2.5 U	0.003 U	0.0048 U	0.0034 U	0.0036 U	0.0042 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	0.0011 U	0.00095 U	2 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
1,2-Dichlorobenzene	100	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 UJ
1,2-Dichloroethane	3.1	0.0011 U	0.00095 U	0.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
1,2-Dichloropropane	NS	0.0011 U	0.00095 UJ	1 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
1,3,5-Trimethylbenzene (Mesitylene)	52	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.028 J	0.0024 U	0.0028 UJ
1,3-Dichlorobenzene	49	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 UJ
1,3-Dichloropropane	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
1,4-Dichlorobenzene	13	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 UJ	0.0024 U	0.0028 UJ
1,4-Diethyl Benzene	NS	0.0022 U	0.0019 U	2 U	0.002 U	0.0032 U	0.033 J	0.0024 U	0.0028 UJ
2,2-Dichloropropane	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
2-Chlorotoluene	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 UJ
2-Hexanone	NS	0.011 U	0.0095 U	5 U	0.01 U	0.016 U	0.011 U	0.012 U	0.014 U
4-Chlorotoluene	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 UJ
4-Ethyltoluene	NS	0.0022 U	0.0019 U	2 U	0.002 U	0.0032 U	0.052 J	0.0024 U	0.0028 UJ
Acetone	100	0.055	0.0095 U	13	0.01 U	0.016 U	0.14	0.012 U	0.014 U
Acrylonitrile	NS	0.0045 U	0.0038 UJ	5 U	0.004 U	0.0064 U	0.0046 U	0.0048 U	0.0056 U
Benzene	4.8	0.00056 U	0.00047 U	0.16 J	0.0005 U	0.0008 U	0.039 J	0.0006 U	0.0007 U
Bromobenzene	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 UJ
Bromochloromethane	NS	0.0022 UJ	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
Bromodichloromethane	NS	0.00056 U	0.00047 U	0.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 U
Bromoform	NS	0.0045 U	0.0038 U	2 U	0.004 U	0.0064 U	0.0046 U	0.0048 U	0.0056 U
Bromomethane	NS	0.0022 UJ	0.0019 UJ	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
Carbon Disulfide	NS	0.011 U	0.0095 U	5 U	0.01 U	0.016 U	0.011 U	0.012 U	0.014 U
Carbon Tetrachloride	2.4	0.0011 U	0.00095 U	0.5 UJ	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
Chlorobenzene	100	0.00056 U	0.00047 U	2.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 UJ
Chloroethane	NS	0.0022 U	0.0019 UJ	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
Chloroform	49	0.00019 J	0.0014 U	2.5 U	0.00079 J	0.0024 U	0.0017 U	0.0012 J	0.0021 U
Chloromethane	NS	0.0045 U	0.0038 U	2.5 U	0.004 U	0.0064 U	0.0046 U	0.0048 U	0.0056 U
Cis-1,2-Dichloroethylene	100	0.00036 J	0.00044 J	2.5 U	0.001 U	0.0016 U	0.026 J	0.0012 U	0.0014 U
Cis-1,3-Dichloropropene	NS	0.00056 U	0.00047 UJ	0.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 U
Cymene	NS	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.016 J	0.0012 U	0.0014 UJ
Dibromochloromethane	NS	0.0011 U	0.00095 U	0.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
Dibromomethane	NS	0.0022 U	0.0019 U	5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
Dichlorodifluoromethane	NS	0.011 UJ	0.0095 U	5 U	0.01 U	0.016 U	0.011 U	0.012 U	0.014 U
Dichloroethylenes	NS	0.00036 J	0.00044 J	2.5 U	0.001 U	0.0016 U	0.026 J	0.0012 U	0.0014 U
Diethyl Ether (Ethyl Ether)	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
Ethylbenzene	41	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.05 J	0.0012 U	0.0014 UJ
Isopropylbenzene (Cumene)	NS	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
M,P-Xylenes	NS	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.19	0.0024 U	0.0028 U
Methyl Ethyl Ketone (2-Butanone)	100	0.011 UJ	0.0095 U	2.1 J	0.01 U	0.016 U	0.011 U	0.012 U	0.014 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	0.011 U	0.0095 U	5 U	0.01 U	0.016 U	0.17 J	0.012 U	0.014 U
Methylene Chloride	100	0.0056 U	0.0047 U	2.5 U	0.005 U	0.008 U	0.0057 U	0.006 U	0.007 U
N-Butylbenzene	100	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.0011 UJ	0.0012 U	0.0014 UJ
N-Propylbenzene	100	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.02 J	0.0012 U	0.0014 UJ
O-Xylene (1,2-Dimethylbenzene)	NS	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.11	0.0012 U	0.0014 U
Sec-Butylbenzene	100	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 UJ
Styrene	NS	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 UJ
T-Butylbenzene	100	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 UJ
Tert-Butyl Methyl Ether	100	0.0022 U	0.0019 U	2.5 U	0.002 U	0.0032 U	0.0023 U	0.0024 U	0.0028 U
Tetrachloroethylene (PCE)	19	0.00056 U	0.00047 U	0.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 UJ
Toluene	100	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.094	0.0012 U	0.0014 UJ
Total, 1,3-Dichloropropene (Cis And Trans)	NS	0.00056 U	0.00047 UJ	0.5 U	0.0005 U	0.0008 U	0.00057 U	0.0006 U	0.0007 UJ
Trans-1,2-Dichloroethene	100	0.0017 U	0.0014 U	2.5 U	0.0015 U	0.0024 U	0.0017 U	0.0018 U	0.0021 U
Trans-1,3-Dichloropropene	NS	0.0011 U	0.00095 U	0.5 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 UJ
Trans-1,4-Dichloro-2-Butene	NS	0.0056 UJ	0.0047 U	2.5 U	0.005 U	0.008 U	0.0057 U	0.006 U	0.007 UJ
Trichloroethylene (TCE)	21	0.00068	0.0012	0.5 U	0.0005 U	0.0008 U	0.33	0.0069	0.00061 J
Trichlorofluoromethane	NS	0.0045 U	0.0038 U	2.5 U	0.004 U	0.0064 U	0.0046 U	0.0048 U	0.0056 U
Vinyl Acetate	NS	0.011 U	0.0095 U	5 UJ	0.01 UJ	0.016 UJ	0.011 UJ	0.012 UJ	0.014 UJ
Vinyl Chloride	0.9	0.0011 U	0.00095 U	1 U	0.001 U	0.0016 U	0.0011 U	0.0012 U	0.0014 U
Xylenes, Total	100	0.0011 U	0.00095 U	2.5 U	0.001 U	0.0016 U	0.3	0.0012 U	0.0014 U

Table 1A
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
VOCs

	AKRF Sample ID	EXD-S2-09052018	EXD-W1-09062018	EXD-W2-09062018	EXE-B-08272018	EXE-E-08272018	EXE-N-08272018	EXE-DUPE-08272018	EXE-S-08272018
	Laboratory Sample ID	L1835198-04	L1835198-09	L1835198-10	L1833887-01	L1833887-03	L1833887-02	L1833887-05	L1833887-04
	Date Sampled	9/5/2018 2:00:00 PM	9/6/2018 8:30:00 AM	9/6/2018 8:25:00 AM	8/27/2018 2:00:00 PM	8/27/2018 2:10:00 PM	8/27/2018 2:05:00 PM	8/27/2018 2:15:00 PM	8/27/2018 2:15:00 PM
	Dilution Factor	1	1	1	1	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	0.00049 U	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
1,1,1-Trichloroethane	100	0.00049 U	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
1,1,2,2-Tetrachloroethane	NS	0.00049 U	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
1,1,2-Trichloroethane	NS	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
1,1-Dichloroethane	26	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
1,1-Dichloroethene	100	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
1,1-Dichloropropene	NS	0.00049 U	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
1,2,3-Trichlorobenzene	NS	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
1,2,3-Trichloropropane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0029 U
1,2,4,5-Tetramethylbenzene	NS	0.002 UJ	0.00066 J	0.0022 U	0.11 J	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
1,2,4-Trichlorobenzene	NS	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
1,2,4-Trimethylbenzene	52	0.002 UJ	0.0026 U	0.0022 U	0.28	0.002 U	0.0027 U	0.00068 J	0.00049 J
1,2-Dibromo-3-Chloropropane	NS	0.003 U	0.0038 U	0.0034 U	0.22 U	0.003 U	0.004 U	0.0046 U	0.0043 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 UJ	0.0013 U	0.0015 UJ	0.0014 U
1,2-Dichlorobenzene	100	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
1,2-Dichloroethane	3.1	0.00099 U	0.0013 U	0.0011 U	0.036 J	0.001 U	0.0013 U	0.0015 U	0.0014 U
1,2-Dichloropropane	NS	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
1,3,5-Trimethylbenzene (Mesitylene)	52	0.002 UJ	0.0026 U	0.0022 U	0.22	0.002 U	0.0027 U	0.00048 J	0.0003 J
1,3-Dichlorobenzene	49	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
1,3-Dichloropropane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
1,4-Dichlorobenzene	13	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
1,4-Diethyl Benzene	NS	0.002 UJ	0.0026 U	0.0022 U	0.37	0.002 U	0.0027 U	0.0031 U	0.0028 U
2,2-Dichloropropane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
2-Chlorotoluene	NS	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 UJ	0.0031 UJ	0.0028 UJ
2-Hexanone	NS	0.0099 U	0.013 U	0.011 U	0.73 U	0.01 U	0.013 U	0.015 U	0.014 U
4-Chlorotoluene	NS	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
4-Ethyltoluene	NS	0.002 UJ	0.0026 U	0.0022 U	0.23	0.002 U	0.0027 U	0.00075 J	0.0028 U
Acetone	100	0.0099 U	0.068	0.011 U	0.73 U	0.01 U	0.013 U	0.015 U	0.014 U
Acrylonitrile	NS	0.0039 U	0.0051 U	0.0045 U	0.29 U	0.004 U	0.0053 U	0.0061 U	0.0058 U
Benzene	4.8	0.00049 U	0.00064 U	0.00056 U	0.1	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Bromobenzene	NS	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
Bromochloromethane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
Bromodichloromethane	NS	0.00049 U	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Bromoform	NS	0.0039 U	0.0051 U	0.0045 U	0.29 U	0.004 U	0.0053 U	0.0061 U	0.0056 U
Bromomethane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 UJ	0.0031 UJ	0.0028 UJ
Carbon Disulfide	NS	0.0099 U	0.013 U	0.011 U	0.73 U	0.01 U	0.013 U	0.015 U	0.014 U
Carbon Tetrachloride	2.4	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
Chlorobenzene	100	0.00049 UJ	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Chloroethane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
Chloroform	49	0.0015 U	0.0019 U	0.0017 U	0.012 J	0.0015 U	0.002 U	0.00063 J	0.00097 J
Chloromethane	NS	0.0039 U	0.0051 U	0.0045 U	0.29 U	0.004 UJ	0.0053 UJ	0.0061 UJ	0.0056 UJ
Cis-1,2-Dichloroethylene	100	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
Cis-1,3-Dichloropropene	NS	0.00049 U	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Cymene	NS	0.00099 UJ	0.0013 U	0.0011 U	0.073 U	0.001 UJ	0.0013 U	0.0015 UJ	0.0014 U
Dibromochloromethane	NS	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0019 U	0.0015 U	0.0014 U
Dibromomethane	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 UJ	0.0027 U	0.0031 UJ	0.0028 U
Dichlorodifluoromethane	NS	0.0099 U	0.013 U	0.011 U	0.73 U	0.01 U	0.013 U	0.015 U	0.014 U
Dichloroethylenes	NS	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
Diethyl Ether (Ethyl Ether)	NS	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
Ethylbenzene	41	0.00099 UJ	0.0013 U	0.0011 U	0.077	0.00019 J	0.0013 U	0.00027 J	0.00053 J
Isopropylbenzene (Cumene)	NS	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
M,P-Xylenes	NS	0.002 U	0.0026 U	0.0022 U	0.59	0.002 U	0.0027 U	0.0031 U	0.0008 J
Methyl Ethyl Ketone (2-Butanone)	100	0.0099 U	0.013 U	0.011 U	0.73 U	0.01 U	0.013 U	0.015 U	0.006 J
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	0.0099 U	0.013 U	0.011 U	0.73 U	0.01 U	0.013 U	0.015 U	0.014 U
Methylene Chloride	100	0.0049 U	0.0064 U	0.0056 U	0.36 U	0.005 U	0.0066 U	0.0077 U	0.007 U
N-Butylbenzene	100	0.00099 UJ	0.0013 U	0.0011 U	0.017 J	0.001 UJ	0.0013 U	0.0015 UJ	0.0014 U
N-Propylbenzene	100	0.00099 UJ	0.0013 U	0.0011 U	0.033 J	0.001 U	0.0013 U	0.0015 U	0.0014 U
O-Xylene (1,2-Dimethylbenzene)	NS	0.00099 U	0.0013 U	0.0011 U	0.18	0.001 U	0.0013 U	0.0015 U	0.0014 U
Sec-Butylbenzene	100	0.00099 UJ	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
Styrene	NS	0.00099 UJ	0.0013 U	0.0011 U	0.073 U	0.001 UJ	0.0013 U	0.0015 UJ	0.0014 U
T-Butylbenzene	100	0.002 UJ	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
Tert-Butyl Methyl Ether	100	0.002 U	0.0026 U	0.0022 U	0.15 U	0.002 U	0.0027 U	0.0031 U	0.0028 U
Tetrachloroethylene (PCE)	19	0.00049 UJ	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Toluene	100	0.00099 UJ	0.0013 U	0.0011 U	0.58	0.00058 J	0.0013 U	0.0015 U	0.001 J
Total, 1,3-Dichloropropene (Cis And Trans)	NS	0.00049 UJ	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Trans-1,2-Dichloroethene	100	0.0015 U	0.0019 U	0.0017 U	0.11 U	0.0015 U	0.002 U	0.0023 U	0.0021 U
Trans-1,3-Dichloropropene	NS	0.00099 UJ	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
Trans-1,4-Dichloro-2-Butene	NS	0.0049 UJ	0.0064 U	0.0056 U	0.36 UJ	0.005 UJ	0.0066 U	0.0077 UJ	0.007 U
Trichloroethylene (TCE)	21	0.00037 J	0.00064 U	0.00056 U	0.036 U	0.0005 U	0.00066 U	0.00077 U	0.0007 U
Trichlorofluoromethane	NS	0.0039 U	0.0051 U	0.0045 U	0.29 U	0.004 U	0.0053 U	0.0061 U	0.0056 U
Vinyl Acetate	NS	0.0099 UJ	0.013 UJ	0.011 UJ	0.73 UJ	0.01 UJ	0.013 U	0.015 UJ	0.014 U
Vinyl Chloride	0.9	0.00099 U	0.0013 U	0.0011 U	0.073 U	0.001 U	0.0013 U	0.0015 U	0.0014 U
Xylenes, Total	100	0.00099 U	0.0013 U	0.0011 U	0.77	0.001 U	0.0013 U	0.0015 U	0.0008 J

Table 1A
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
VOCs

	AKRF Sample ID	UST-E-08012019	UST-N-08012019	UST-S-08012019	UST-W-08012019	UST-E-05302019	UST-N-05302019	UST-S-05302019	UST-W-05302019
	Laboratory Sample ID	L1934191-03	L1934191-01	L1934191-02	L1934191-04	L1922866-02	L1922866-01	L1922866-03	L1922866-04
	Date Sampled	8/1/2019 7:50:00 AM	8/1/2019 7:40:00 AM	8/1/2019 7:45:00 AM	8/1/2019 7:55:00 AM	5/30/2019 7:20:00 AM	5/30/2019 7:15:00 AM	5/30/2019 7:25:00 AM	5/30/2019 7:30:00 AM
	Dilution Factor	1	1	1	1	2	2	4	4
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,1,1,2-Tetrachloroethane	NS	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
1,1,1-Trichloroethane	100	0.00068 U	0.00065 U	0.00055 J	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
1,1,2,2-Tetrachloroethane	NS	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
1,1,2-Trichloroethane	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
1,1-Dichloroethane	26	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
1,1-Dichloroethene	100	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
1,1-Dichloropropene	NS	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
1,2,3-Trichlorobenzene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,2,3-Trichloropropane	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,2,4,5-Tetramethylbenzene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	25	10	14	24
1,2,4-Trichlorobenzene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,2,4-Trimethylbenzene	52	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.3 J	0.16 J	0.52 U	0.17 J
1,2-Dibromo-3-Chloropropane	NS	0.004 U	0.0039 U	0.0044 U	0.0039 U	0.58 U	0.42 U	0.79 U	0.87 U
1,2-Dibromoethane (Ethylene Dibromide)	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
1,2-Dichlorobenzene	100	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,2-Dichloroethane	3.1	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.073 J	0.29 U
1,2-Dichloropropane	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
1,3,5-Trimethylbenzene (Mesitylene)	52	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.067 J	0.05 J	0.52 U	0.58 U
1,3-Dichlorobenzene	49	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,3-Dichloropropane	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,4-Dichlorobenzene	13	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
1,4-Diethyl Benzene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	6.3	1.6	3.5	0.43 J
2,2-Dichloropropane	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
2-Chlorotoluene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
2-Hexanone	NS	0.014 U	0.013 U	0.015 U	0.013 U	1.9 U	1.4 U	2.6 U	2.9 U
4-Chlorotoluene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
4-Ethyltoluene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.22 J	0.1 J	0.52 U	0.23 J
Acetone	100	0.14	0.013 U	0.15	0.07	1.2 J	0.77 J	1.3 J	1.4 J
Acrylonitrile	NS	0.0054 U	0.0052 U	0.0059 U	0.0052 U	0.77 U	0.56 U	1 U	1.2 U
Benzene	4.8	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.18	0.07 U	0.13 U	0.093 J
Bromobenzene	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Bromochloromethane	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Bromodichloromethane	NS	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
Bromoform	NS	0.0054 U	0.0052 U	0.0059 U	0.0052 U	0.77 U	0.56 U	1 U	1.2 U
Bromomethane	NS	0.00081 J	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Carbon Disulfide	NS	0.014 U	0.013 U	0.015 U	0.013 U	1.9 U	1.4 U	2.6 U	2.9 U
Carbon Tetrachloride	2.4	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
Chlorobenzene	100	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
Chloroethane	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Chloroform	49	0.002 U	0.0019 U	0.00031 J	0.00039 J	0.29 U	0.21 U	0.39 U	0.44 U
Chloromethane	NS	0.0054 U	0.0052 U	0.0059 U	0.0052 U	0.77 U	0.56 U	1 U	1.2 U
Cis-1,2-Dichloroethylene	100	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
Cis-1,3-Dichloropropene	NS	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
Cymene	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.035 J	0.14 U	0.26 U	0.29 U
Dibromochloromethane	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
Dibromomethane	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Dichlorodifluoromethane	NS	0.014 U	0.013 U	0.015 U	0.013 U	1.9 U	1.4 U	2.6 U	2.9 U
Dichloroethylenes	NS	0.0014 U	0.0013 U	0.0015 U	0.00047 J	0.19 U	0.14 U	0.26 U	0.29 U
Diethyl Ether (Ethyl Ether)	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Ethylbenzene	41	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19	0.042 J	0.046 J	0.17 J
Isopropylbenzene (Cumene)	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	4.5	2.1	3.6	2.8
M,P-Xylenes	NS	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.56	0.25 J	0.52 U	0.42 J
Methyl Ethyl Ketone (2-Butanone)	100	0.0035 J	0.013 U	0.015 U	0.013 U	1.9 U	1.4 U	2.6 U	2.9 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	0.014 U	0.013 U	0.015 U	0.013 U	1.9 U	1.4 U	2.6 U	2.9 U
Methylene Chloride	100	0.0068 U	0.0065 U	0.0074 U	0.0065 U	0.96 U	0.7 U	1.3 U	1.4 U
N-Butylbenzene	100	0.0014 U	0.0013 U	0.0015 U	0.0013 U	11	2.9	3.2	1.7
N-Propylbenzene	100	0.0014 U	0.0013 U	0.0015 U	0.0013 U	10	3.7	7	2.5
O-Xylene (1,2-Dimethylbenzene)	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.12 J	0.049 J	0.26 U	0.29 U
Sec-Butylbenzene	100	0.0014 U	0.0013 U	0.0015 U	0.0013 U	11	3.8	6.8	10
Styrene	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
T-Butylbenzene	100	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.7	0.32	0.43 J	0.75
Tert-Butyl Methyl Ether	100	0.0027 U	0.0026 U	0.0029 U	0.0026 U	0.38 U	0.28 U	0.52 U	0.58 U
Tetrachloroethylene (PCE)	19	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
Toluene	100	0.00082 J	0.0013 U	0.0015 U	0.0013 U	0.12 J	0.14 U	0.26 U	0.29 U
Total, 1,3-Dichloropropene (Cis And Trans)	NS	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.13 U	0.14 U
Trans-1,2-Dichloroethene	100	0.002 U	0.0019 U	0.0022 U	0.00047 J	0.29 U	0.21 U	0.39 U	0.44 U
Trans-1,3-Dichloropropene	NS	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
Trans-1,4-Dichloro-2-Butene	NS	0.0068 U	0.0065 U	0.0074 U	0.0065 U	0.96 U	0.7 U	1.3 U	1.4 U
Trichloroethylene (TCE)	21	0.00068 U	0.00065 U	0.00074 U	0.00065 U	0.096 U	0.07 U	0.36	0.14 U
Trichlorofluoromethane	NS	0.0054 U	0.0052 U	0.0059 U	0.0052 U	0.77 U	0.56 U	1 U	1.2 U
Vinyl Acetate	NS	0.014 U	0.013 U	0.015 U	0.013 U	1.9 U	1.4 U	2.6 U	2.9 U
Vinyl Chloride	0.9	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.19 U	0.14 U	0.26 U	0.29 U
Xylenes, Total	100	0.0014 U	0.0013 U	0.0015 U	0.0013 U	0.68 J	0.3 J	0.26 U	0.42 J

Table 1B
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
SVOCs

	AKRF Sample ID	EX11-B-07272018	EX11-W-07272018	EX 2-E-08302019	EX 2-N-08302019	EX 2-S-08302019	EX 2-W-08302019	EX3-E1-09132018	EX3-S1-09122018	EX3-S2-09122018
	Laboratory Sample ID	L1829172-13	L1829172-12	L1939673-03	L1939673-01	L1939673-02	L1939673-04	L1836384-05	L1836198-01	L1836198-02
	Date Sampled	7/27/2018 1:25:00 PM	7/27/2018 1:20:00 PM	8/30/2019 11:20:00 AM	8/30/2019 11:00:00 AM	8/30/2019 11:10:00 AM	8/30/2019 11:30:00 AM	9/13/2018 10:50:00 AM	9/12/2018 11:20:00 AM	9/12/2018 11:25:00 AM
	Dilution Factor	1	1	1	1	1	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2,4,5-Trichlorophenol	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2,4,6-Trichlorophenol	NS	0.11 U	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.12 U	0.12 U	0.11 U
2,4-Dichlorophenol	NS	0.16 U	0.18 U	0.19 U	0.18 U	0.19 U	0.18 U	0.18 U	0.18 U	0.17 U
2,4-Dimethylphenol	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2,4-Dinitrophenol	NS	0.88 U	0.95 U	0.99 U	0.95 U	1 U	0.98 U	0.93 U	0.94 U	0.89 U
2,4-Dinitrotoluene	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2,6-Dinitrotoluene	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2-Chloronaphthalene	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.044 J	0.2 U	0.19 U	0.2 U	0.19 U
2-Chlorophenol	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2-Methylnaphthalene	NS	0.026 J	0.12 J	0.046 J	0.085 J	0.66	0.38	0.34	0.24 U	0.35
2-Methylphenol (O-Cresol)	100	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2-Nitroaniline	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
2-Nitrophenol	NS	0.4 U	0.43 U	0.45 U	0.43 U	0.46 U	0.44 U	0.42 U	0.42 U	0.4 U
3- And 4- Methylphenol (Total)	NS	0.26 U	0.28 U	0.3 U	0.28 U	0.044 J	0.29 U	0.28 U	0.28 U	0.064 J
3,3'-Dichlorobenzidine	NS	0.18 U	0.2 U	0.21 U	0.2 UJ	0.21 UJ	0.2 U	0.19 U	0.2 U	0.19 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	0.3 U	0.28 U	0.044 J	0.29 U	NA	NA	NA
3-Nitroaniline	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
4,6-Dinitro-2-Methylphenol	NS	0.48 U	0.51 U	0.54 U	0.52 U	0.56 U	0.53 U	0.51 U	0.51 U	0.48 U
4-Bromophenyl Phenyl Ether	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
4-Chloro-3-Methylphenol	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
4-Chloroaniline	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
4-Chlorophenyl Phenyl Ether	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
4-Nitroaniline	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
4-Nitrophenol	NS	0.26 U	0.28 U	0.29 UJ	0.28 U	0.3 U	0.28 UJ	0.27 U	0.27 U	0.26 U
Acenaphthene	100	0.02 J	0.32	0.16 U	0.16 U	0.13 J	0.27	0.55	0.16 U	0.12 J
Acenaphthylene	100	0.15 U	0.48	0.16 U	0.049 J	0.32	0.076 J	0.14 J	0.16 U	0.28
Acetophenone	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.057 J	0.19 U	0.2 U	0.19 U
Anthracene	100	0.11 U	0.96	0.12 U	0.12 U	0.61	0.5	0.82	0.12 U	0.21
Benzo(a)Anthracene	**1**	0.097 J	**2.6**	0.084 J	0.087 J	**2**	**1.3**	**1.5**	0.12 U	0.5
Benzo(a)Pyrene	**1**	0.1 J	**2.2**	0.15 J	0.14 J	**2.2**	**1.2**	**1.3**	0.16 U	0.74
Benzo(b)Fluoranthene	**1**	0.16	**3.1**	0.16	0.18	**2.9**	**1.6**	**1.6**	0.12 U	1
Benzo(g,h,i)Perylene	100	0.087 J	1.4	0.12 J	0.12 J	1.3	0.82	0.72	0.16 U	0.53
Benzo(k)Fluoranthene	**3.9**	0.042 J	0.87	0.041 J	0.052 J	0.85	0.55	0.56	0.12 U	0.29
Benzoic Acid	NS	0.6 U	0.64 U	0.67 U	0.64 R	0.69 R	0.66 U	0.63 U	0.64 U	0.6 U
Benzyl Alcohol	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Benzyl Butyl Phthalate	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Biphenyl (Diphenyl)	NS	0.42 U	0.45 U	0.47 U	0.45 U	0.099 J	0.058 J	0.083 J	0.45 U	0.052 J
Bis(2-Chloroethoxy) Methane	NS	0.2 U	0.21 U	0.22 U	0.21 U	0.23 U	0.22 U	0.21 U	0.21 U	0.2 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	0.16 U	0.18 U	0.19 U	0.18 U	0.19 U	0.18 U	0.18 U	0.18 U	0.17 U
Bis(2-Chloroisopropyl) Ether	NS	0.22 U	0.24 U	0.25 UJ	0.24 U	0.26 U	0.24 UJ	0.23 U	0.24 U	0.22 U
Bis(2-Ethylhexyl) Phthalate	NS	0.18 U	0.2 U	0.21 U	0.2 UJ	0.21 UJ	0.2 U	0.19 U	0.2 U	0.19 U
Carbazole	NS	0.18 U	0.17 J	0.21 U	0.2 U	0.14 J	0.18 J	0.29	0.2 U	0.086 J
Chrysene	**3.9**	0.14	2.4	0.096 J	0.091 J	1.9	1.2	1.4	0.12 U	0.6
Dibenz(a,h)Anthracene	**0.33**	0.021 J	**0.36**	0.028 J	0.031 J	**0.34**	0.2	0.17	0.12 U	0.12
Dibenzofuran	59	0.021 J	0.15 J	0.21 U	0.2 U	0.12 J	0.13 J	0.23	0.2 U	0.1 J
Diethyl Phthalate	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Dimethyl Phthalate	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Di-N-Butyl Phthalate	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.11 J	0.075 J	0.19 U	0.2 U	0.19 U
Di-N-Octylphthalate	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Fluoranthene	100	0.17	4.8	0.11 J	0.074 J	3.3	2.5	3.2	0.12 U	1
Fluorene	100	0.025 J	0.29	0.21 U	0.2 U	0.18 J	0.22	0.4	0.2 U	0.16 J
Hexachlorobenzene	1.2	0.11 U	0.12 U	0.12 U	0.12 U	0.13 U	0.12 U	0.12 U	0.12 U	0.11 U
Hexachlorobutadiene	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Hexachlorocyclopentadiene	NS	0.53 U	0.56 U	0.59 U	0.57 U	0.61 U	0.58 U	0.56 U	0.56 U	0.53 U
Hexachloroethane	NS	0.15 U	0.16 U	0.16 U	0.16 U	0.17 U	0.16 U	0.16 U	0.16 U	0.15 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	0.083 J	**1.6**	0.1 J	0.12 J	**1.4**	**0.84**	**0.76**	0.16 U	**0.56**
Isophorone	NS	0.16 U	0.18 U	0.19 U	0.18 U	0.19 U	0.18 U	0.18 U	0.18 U	0.17 U
Naphthalene	100	0.081 J	0.2	0.025 J	0.046 J	0.48	0.28	0.83	0.2 U	0.34
Nitrobenzene	NS	0.16 U	0.18 U	0.19 UJ	0.18 U	0.19 U	0.18 UJ	0.18 U	0.18 U	0.17 U
N-Nitrosodi-N-Propylamine	NS	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
N-Nitrosodiphenylamine	NS	0.15 U	0.16 U	0.16 U	0.16 U	0.17 U	0.16 U	0.16 U	0.16 U	0.15 U
Pentachlorophenol	6.7	0.15 U	0.16 U	0.16 U	0.16 U	0.17 U	0.16 U	0.16 U	0.16 U	0.15 U
Phenanthrene	100	0.19	3.2	0.054 J	0.034 J	1.8	1.8	2.6	0.12 U	0.62
Phenol	100	0.18 U	0.2 U	0.21 U	0.2 U	0.21 U	0.2 U	0.19 U	0.2 U	0.19 U
Pyrene	100	0.16	4.3	0.11 J	0.08 J	3.2	2.3	2.7	0.12 U	1

Table 1B
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
SVOCs

	AKRF Sample ID	EX3-W1-09132018	EX3-W2-09132018	EX3-W3-09132018	EX4-B-08012018	EX4-B-08012018	EX4-E1-09102018	EX4-E2-09112018	EX4-N1-09112018	EX4-N2-09112018
	Laboratory Sample ID	L1836384-06	L1836384-07	L1836384-08	L1829730-04	L1829730-04	L1835749-03	L1836132-09	L1836132-07	L1836132-08
	Date Sampled	9/13/2018 1:10:00 PM	9/13/2018 1:15:00 PM	9/13/2018 1:20:00 PM	8/1/2018 10:00:00 AM	8/1/2018 10:00:00 AM	9/10/2018 12:50:00 PM	9/11/2018 12:30:00 PM	9/11/2018 12:20:00 PM	9/11/2018 12:25:00 PM
	Dilution Factor	1	1	1	1	10	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2,4,5-Trichlorophenol	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2,4,6-Trichlorophenol	NS	0.12 U	0.12 U	0.12 U	0.12 U	NA	0.13 U	0.11 U	0.1 U	0.11 U
2,4-Dichlorophenol	NS	0.17 U	0.18 U	0.18 U	0.17 U	NA	0.19 U	0.16 U	0.16 U	0.16 U
2,4-Dimethylphenol	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2,4-Dinitrophenol	NS	0.92 U	0.97 U	0.95 U	0.92 U	NA	1 U	0.86 U	0.83 U	0.86 U
2,4-Dinitrotoluene	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2,6-Dinitrotoluene	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2-Chloronaphthalene	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2-Chlorophenol	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2-Methylnaphthalene	NS	0.2 J	0.032 J	0.025 J	0.81	NA	0.49	0.21 U	0.16 J	0.45
2-Methylphenol (O-Cresol)	100	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2-Nitroaniline	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
2-Nitrophenol	NS	0.42 U	0.44 U	0.43 U	0.42 U	NA	0.46 U	0.38 U	0.37 U	0.39 U
3- And 4- Methylphenol (Total)	NS	0.28 U	0.057 J	0.091 J	0.24 J	NA	0.4	0.26 U	0.25 U	0.26 U
3,3'-Dichlorobenzidine	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
4,6-Dinitro-2-Methylphenol	NS	0.5 U	0.53 U	0.51 U	0.5 U	NA	0.56 U	0.46 U	0.45 U	0.47 U
4-Bromophenyl Phenyl Ether	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
4-Chloro-3-Methylphenol	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
4-Chloroaniline	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
4-Chlorophenyl Phenyl Ether	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
4-Nitroaniline	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
4-Nitrophenol	NS	0.27 U	0.28 U	0.28 U	0.27 U	NA	0.3 U	0.25 U	0.24 U	0.25 U
Acenaphthene	100	0.077 J	0.09 J	0.049 J	0.43	NA	0.11 J	0.14 U	0.09 J	0.17
Acenaphthylene	100	0.04 J	0.11 J	0.056 J	2.2	NA	0.07 J	0.14 U	0.23	0.091 J
Acetophenone	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Anthracene	100	0.082 J	0.33	0.13	6	NA	0.29	0.11 U	0.24	0.27
Benzo(a)Anthracene	**1**	0.15	**1.2**	0.46	NA	**17 D**	0.56	0.11 U	0.52	0.66
Benzo(a)Pyrene	**1**	0.14 J	**1.2**	0.49	NA	**17 D**	0.45	0.14 U	0.44	0.69
Benzo(b)Fluoranthene	**1**	0.16	**1.4**	0.56	NA	**19 D**	0.64	0.11 U	0.5	0.89
Benzo(g,h,i)Perylene	100	0.09 J	0.77	0.31	NA	8.9 D	0.34	0.14 U	0.26	0.46
Benzo(k)Fluoranthene	**3.9**	0.051 J	0.49	0.2	**5.2**	NA	0.24	0.11 U	0.19	0.28
Benzoic Acid	NS	0.62 U	0.66 U	0.64 U	0.62 U	NA	0.7 UJ	0.58 U	0.56 U	0.58 U
Benzyl Alcohol	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Benzyl Butyl Phthalate	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Biphenyl (Diphenyl)	NS	0.44 U	0.46 U	0.45 U	0.38 J	NA	0.083 J	0.41 U	0.39 U	0.41 U
Bis(2-Chloroethoxy) Methane	NS	0.21 U	0.22 U	0.21 U	0.21 U	NA	0.23 U	0.19 U	0.19 U	0.19 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	0.17 U	0.18 U	0.18 U	0.17 U	NA	0.19 U	0.16 U	0.16 U	0.16 U
Bis(2-Chloroisopropyl) Ether	NS	0.23 U	0.24 U	0.24 U	0.23 U	NA	0.26 U	0.21 U	0.21 U	0.22 U
Bis(2-Ethylhexyl) Phthalate	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Carbazole	NS	0.023 J	0.13 J	0.044 J	0.34	NA	0.14 J	0.18 U	0.044 J	0.1 J
Chrysene	**3.9**	0.14	1.1	0.45	NA	**16 D**	0.72	0.11 U	0.56	0.64
Dibenz(a,h)Anthracene	**0.33**	0.12 U	0.15	0.063 J	**2.1**	NA	0.081 J	0.11 U	0.06 J	0.11
Dibenzofuran	59	0.027 J	0.06 J	0.037 J	0.59	NA	0.16 J	0.18 U	0.031 J	0.086 J
Diethyl Phthalate	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Dimethyl Phthalate	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Di-N-Butyl Phthalate	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Di-N-Octylphthalate	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Fluoranthene	100	0.4	2.3	0.81	NA	35 D	1.6	0.11 U	0.95	1.3
Fluorene	100	0.077 J	0.1 J	0.052 J	0.95	NA	0.17 J	0.18 U	0.097 J	0.14 J
Hexachlorobenzene	1.2	0.12 U	0.12 U	0.12 U	0.12 U	NA	0.13 U	0.11 U	0.1 U	0.11 U
Hexachlorobutadiene	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
Hexachlorocyclopentadiene	NS	0.55 U	0.58 U	0.56 U	0.55 U	NA	0.62 UJ	0.51 U	0.49 U	0.51 U
Hexachloroethane	NS	0.15 U	0.16 U	0.16 U	0.15 U	NA	0.17 U	0.14 U	0.14 U	0.14 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	0.086 J	**0.78**	0.31	NA	**9.8 D**	0.34	0.14 U	0.25	0.46
Isophorone	NS	0.17 U	0.18 U	0.18 U	0.17 U	NA	0.19 U	0.16 U	0.16 U	0.16 U
Naphthalene	100	0.19	0.094 J	0.073 J	1.5	NA	0.49	0.18 U	0.1 J	0.37
Nitrobenzene	NS	0.17 U	0.18 U	0.18 U	0.17 U	NA	0.19 U	0.16 U	0.16 U	0.16 U
N-Nitrosodi-N-Propylamine	NS	0.19 U	0.2 U	0.2 U	0.19 U	NA	0.22 U	0.18 U	0.17 U	0.18 U
N-Nitrosodiphenylamine	NS	0.15 U	0.16 U	0.16 U	0.15 U	NA	0.17 U	0.14 U	0.14 U	0.14 U
Pentachlorophenol	6.7	0.15 U	0.16 U	0.16 U	0.15 U	NA	0.17 UJ	0.14 U	0.14 U	0.14 U
Phenanthrene	100	0.34	1	0.39	NA	19 D	1.2	0.11 U	0.56	0.86
Phenol	100	0.19 U	0.045 J	0.07 J	0.15 J	NA	0.62	0.18 U	0.17 U	0.18 U
Pyrene	100	0.46	2.2	0.77	NA	35 D	1.6	0.11 U	1	1.2

Table 1B
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
SVOCs

	AKRF Sample ID	EX4-S1-09102018	EX4-S2-09102018	EX5-B-07302018	EX5-E-07302018	EX5-N-07302018	EX5-W-07302018	EX6-B-07302018	EX6-N-07302018	EX6-N-07302018
	Laboratory Sample ID	L1835749-01	L1835749-02	L1829306-04	L1829306-02	L1829306-01	L1829306-03	L1829306-06	L1829306-05	L1829306-05
	Date Sampled	9/10/2018 1:15:00 PM	9/10/2018 11:30:00 AM	7/30/2018 12:15:00 PM	7/30/2018 12:05:00 PM	7/30/2018 12:00:00 PM	7/30/2018 12:10:00 PM	7/30/2018 12:35:00 PM	7/30/2018 12:30:00 PM	7/30/2018 12:30:00 PM
	Dilution Factor	1	1	1	1	1	1	1	5	10
	Unit	mg/kg	mg/kg	ug/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	0.21 U	0.19 U	10 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2,4,5-Trichlorophenol	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2,4,6-Trichlorophenol	NS	0.12 U	0.12 U	5 U	0.12 U	0.13 U	0.21 U	0.12 U	0.64 U	NA
2,4-Dichlorophenol	NS	0.19 U	0.18 U	5 U	0.17 U	0.19 U	0.31 U	0.19 U	0.96 U	NA
2,4-Dimethylphenol	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2,4-Dinitrophenol	NS	0.99 U	0.93 U	20 U	0.92 U	1 U	1.7 U	0.99 U	5.1 U	NA
2,4-Dinitrotoluene	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2,6-Dinitrotoluene	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2-Chloronaphthalene	NS	0.21 U	0.19 U	0.2 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2-Chlorophenol	NS	0.21 U	0.19 U	2 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2-Methylnaphthalene	NS	0.094 J	0.37	0.1 J	0.057 J	0.25 U	0.28 J	0.22 J	1.2 J	NA
2-Methylphenol (O-Cresol)	100	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2-Nitroaniline	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
2-Nitrophenol	NS	0.45 U	0.42 U	10 U	0.42 U	0.46 U	0.75 U	0.45 U	2.3 U	NA
3- And 4- Methylphenol (Total)	NS	0.19 J	0.28 U	5 U	0.046 J	0.12 J	1.9	0.83	1.1 J	NA
3,3'-Dichlorobenzidine	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
4,6-Dinitro-2-Methylphenol	NS	0.54 U	0.51 U	10 U	0.5 U	0.55 U	0.91 U	0.54 U	2.8 U	NA
4-Bromophenyl Phenyl Ether	NS	0.21 U	0.19 U	2 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
4-Chloro-3-Methylphenol	NS	0.21 U	0.19 U	2 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
4-Chloroaniline	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
4-Chlorophenyl Phenyl Ether	NS	0.21 U	0.19 U	2 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
4-Nitroaniline	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
4-Nitrophenol	NS	0.29 U	0.27 U	10 U	0.27 U	0.29 U	0.49 U	0.29 U	1.5 U	NA
Acenaphthene	100	0.6	0.091 J	0.33	0.15 U	0.17 U	0.12 J	0.21	3.6	NA
Acenaphthylene	100	0.051 J	0.67	0.1 U	0.048 J	0.17 U	0.11 J	0.23	3.8	NA
Acetophenone	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Anthracene	100	0.12	0.76	0.06 J	0.052 J	0.13 U	0.26	0.47	9.2	NA
Benzo(a)Anthracene	**1**	0.27	**2.3**	0.07 J	0.18	0.042 J	0.49	0.91	**20**	NA
Benzo(a)Pyrene	**1**	0.27	**2**	0.06 J	0.19	0.17 U	0.43	0.84	**20**	NA
Benzo(b)Fluoranthene	**1**	0.37	**2.5**	0.08 J	0.25	0.04 J	0.59	**1.1**	**25**	NA
Benzo(g,h,i)Perylene	100	0.18	1.4	0.05 J	0.12 J	0.17 U	0.28	0.51	12	NA
Benzo(k)Fluoranthene	**3.9**	0.11 J	0.75	0.1 U	0.069 J	0.13 U	0.14 J	0.26	**7**	NA
Benzoic Acid	NS	0.67 UJ	0.63 UJ	50 U	0.62 U	0.68 U	1.1 U	0.67 U	3.4 U	NA
Benzyl Alcohol	NS	0.21 U	0.19 U	2 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Benzyl Butyl Phthalate	NS	0.21 U	0.19 U	5 U	0.07 J	0.21 U	0.35 U	0.21 U	1.1 U	NA
Biphenyl (Diphenyl)	NS	0.47 U	0.086 J	2 U	0.44 U	0.48 U	0.8 U	0.07 J	0.43 J	NA
Bis(2-Chloroethoxy) Methane	NS	0.22 U	0.21 U	5 U	0.21 U	0.23 U	0.38 U	0.22 U	1.2 U	NA
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	0.19 U	0.18 U	2 U	0.17 U	0.19 U	0.31 U	0.19 U	0.96 U	NA
Bis(2-Chloroisopropyl) Ether	NS	0.25 U	0.23 U	2 U	0.23 U	0.25 U	0.42 U	0.25 U	1.3 U	NA
Bis(2-Ethylhexyl) Phthalate	NS	0.21 U	0.19 U	3 U	0.16 J	0.21 U	0.35 U	0.21 U	1.1 U	NA
Carbazole	NS	0.066 J	0.12 J	2 U	0.019 J	0.21 U	0.074 J	0.15 J	2.7	NA
Chrysene	**3.9**	0.29	2.4	0.07 J	0.18	0.044 J	0.5	0.91	**20**	NA
Dibenz(a,h)Anthracene	**0.33**	0.046 J	**0.38**	0.1 U	0.027 J	0.13 U	0.062 J	0.11 J	**2.9**	NA
Dibenzofuran	59	0.1 J	0.12 J	2 U	0.19 U	0.21 U	0.11 J	0.18 J	2.9	NA
Diethyl Phthalate	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Dimethyl Phthalate	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Di-N-Butyl Phthalate	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Di-N-Octylphthalate	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Fluoranthene	100	0.62	3.7	0.16	0.31	0.048 J	1.1	2	NA	52 D
Fluorene	100	0.17 J	0.27	0.12	0.19 U	0.21 U	0.15 J	0.3	5	NA
Hexachlorobenzene	1.2	0.12 U	0.12 U	0.8 UJ	0.12 U	0.13 U	0.21 U	0.12 U	0.64 U	NA
Hexachlorobutadiene	NS	0.21 U	0.19 U	NA	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
Hexachlorocyclopentadiene	NS	0.59 UJ	0.56 UJ	20 UJ	0.55 UJ	0.6 UJ	1 UJ	0.59 UJ	3 U	NA
Hexachloroethane	NS	0.16 U	0.16 U	0.8 U	0.15 U	0.17 U	0.28 U	0.16 U	0.85 U	NA
Indeno(1,2,3-c,d)Pyrene	**0.5**	0.19	**1.4**	0.05 J	0.12 J	0.17 U	0.28	**0.52**	**13**	NA
Isophorone	NS	0.19 U	0.18 U	5 U	0.17 U	0.19 U	0.31 U	0.19 U	0.96 UJ	NA
Naphthalene	100	0.66	0.8	NA	0.079 J	0.064 J	0.44	0.41	3	NA
Nitrobenzene	NS	0.19 U	0.18 U	2 U	0.17 U	0.19 U	0.31 U	0.19 U	0.96 U	NA
N-Nitrosodi-N-Propylamine	NS	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.35 U	0.21 U	1.1 U	NA
N-Nitrosodiphenylamine	NS	0.16 U	0.16 U	2 U	0.15 U	0.17 U	0.28 U	0.16 U	0.85 U	NA
Pentachlorophenol	6.7	0.16 UJ	0.16 UJ	0.8 U	0.15 U	0.17 U	0.28 U	0.16 U	0.85 U	NA
Phenanthrene	100	0.51	2.3	0.2	0.16	0.047 J	0.87	1.8	41	NA
Phenol	100	0.21 U	0.19 U	5 U	0.19 U	0.21 U	0.07 J	0.27	0.28 J	NA
Pyrene	100	0.56	4	0.15	0.3	0.051 J	0.98	1.9	NA	47 D

	AKRF Sample ID	EX7-B-07262018	EX7-N-07262018	EX8-E1-07272018	EX8-E2-07272018	EX8-N-07272018	EX8-S-07272018	EX8-W1-07272018	EX8-W2-07272018	EXA-S-08022018
	Laboratory Sample ID	L1829172-05	L1829172-04	L1829172-08	L1829172-10	L1829172-07	L1829172-06	L1829172-09	L1829172-11	L1830132-01
	Date Sampled	7/26/2018 8:40:00 AM	7/26/2018 8:30:00 AM	7/27/2018 9:50:00 AM	7/27/2018 10:00:00 AM	7/27/2018 9:45:00 AM	7/27/2018 9:40:00 AM	7/27/2018 9:55:00 AM	7/27/2018 10:05:00 AM	8/2/2018 11:05:00 AM
	Dilution Factor	1	5	1	1	1	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2,4,5-Trichlorophenol	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2,4,6-Trichlorophenol	NS	0.13 U	0.61 U	0.11 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
2,4-Dichlorophenol	NS	0.2 U	0.91 U	0.17 U	0.19 U	0.19 U	0.18 U	0.18 U	0.18 U	0.18 U
2,4-Dimethylphenol	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2,4-Dinitrophenol	NS	1.1 U	4.9 U	0.92 U	1 U	1 U	0.95 U	0.97 U	0.99 U	0.93 U
2,4-Dinitrotoluene	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2,6-Dinitrotoluene	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2-Chloronaphthalene	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2-Chlorophenol	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2-Methylnaphthalene	NS	0.24 J	1.2	0.053 J	0.035 J	0.25 U	0.38	0.075 J	0.25 U	0.16 J
2-Methylphenol (O-Cresol)	100	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2-Nitroaniline	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
2-Nitrophenol	NS	0.48 U	2.2 U	0.41 U	0.45 U	0.45 U	0.43 U	0.44 U	0.44 U	0.42 U
3- And 4- Methylphenol (Total)	NS	0.29 J	1.5 U	0.28 U	0.3 U	0.3 U	0.29 U	0.29 U	0.3 U	0.042 J
3,3'-Dichlorobenzidine	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
4,6-Dinitro-2-Methylphenol	NS	0.58 U	2.6 U	0.5 U	0.54 U	0.54 U	0.52 U	0.53 U	0.54 U	0.5 U
4-Bromophenyl Phenyl Ether	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
4-Chloro-3-Methylphenol	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
4-Chloroaniline	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
4-Chlorophenyl Phenyl Ether	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
4-Nitroaniline	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
4-Nitrophenol	NS	0.31 U	1.4 U	0.27 U	0.29 U	0.29 U	0.28 U	0.28 U	0.29 U	0.27 U
Acenaphthene	100	0.28	0.11 J	0.023 J	0.17 U	0.17 U	0.16 U	0.025 J	0.16 U	0.58
Acenaphthylene	100	0.18 U	0.81 U	0.097 J	0.21	0.041 J	0.13 J	0.29	0.16 U	0.34
Acetophenone	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.08 J	0.2 U	0.2 U	0.044 J
Anthracene	100	0.25	0.2 J	0.096 J	0.051 J	0.12 U	0.044 J	0.18	0.12 U	1.7
Benzo(a)Anthracene	**1**	0.32	0.24 J	0.41	0.63	0.097 J	0.5	0.85	0.033 J	**5.9**
Benzo(a)Pyrene	**1**	0.23	0.81 U	0.35	1	0.089 J	0.32	0.72	0.16 U	**5**
Benzo(b)Fluoranthene	**1**	0.33	0.29 J	0.47	**1.1**	0.13	0.59	1	0.039 J	**7.2**
Benzo(g,h,i)Perylene	100	0.14 J	0.2 J	0.26	0.9	0.077 J	0.41	0.57	0.16 U	2.6
Benzo(k)Fluoranthene	**3.9**	0.089 J	0.61 U	0.17	0.32	0.036 J	0.18	0.36	0.12 U	1.8
Benzoic Acid	NS	0.72 U	3.3 U	0.62 U	0.68 U	0.67 U	0.64 U	0.66 U	0.67 U	0.63 U
Benzyl Alcohol	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Benzyl Butyl Phthalate	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Biphenyl (Diphenyl)	NS	0.51 U	0.32 J	0.44 U	0.48 U	0.47 U	0.046 J	0.46 U	0.47 U	0.057 J
Bis(2-Chloroethoxy) Methane	NS	0.24 U	1.1 U	0.21 U	0.23 U	0.22 U	0.21 U	0.22 U	0.22 U	0.21 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	0.2 U	0.91 U	0.17 U	0.19 U	0.19 U	0.18 U	0.18 U	0.18 U	0.18 U
Bis(2-Chloroisopropyl) Ether	NS	0.27 U	1.2 U	0.23 U	0.25 U	0.25 U	0.24 U	0.24 U	0.25 U	0.23 U
Bis(2-Ethylhexyl) Phthalate	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.27
Carbazole	NS	0.22 U	1 U	0.035 J	0.21 U	0.21 U	0.2 U	0.072 J	0.2 U	0.64
Chrysene	**3.9**	0.28	0.28 J	0.4	0.61	0.12	0.4	0.85	0.032 J	**4.9**
Dibenz(a,h)Anthracene	**0.33**	0.036 J	0.61 U	0.063 J	0.14	0.12 U	0.065 J	0.14	0.12 U	**0.78**
Dibenzofuran	59	0.15 J	0.18 J	0.024 J	0.21 U	0.21 U	0.02 J	0.032 J	0.2 U	0.32
Diethyl Phthalate	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Dimethyl Phthalate	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Di-N-Butyl Phthalate	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Di-N-Octylphthalate	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 UJ
Fluoranthene	100	0.9	0.45 J	0.69	0.55	0.15	0.66	1.3	0.056 J	NA
Fluorene	100	0.35	0.4 J	0.034 J	0.21 U	0.21 U	0.028 J	0.046 J	0.2 U	0.63
Hexachlorobenzene	1.2	0.13 U	0.61 U	0.11 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Hexachlorobutadiene	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Hexachlorocyclopentadiene	NS	0.64 U	2.9 U	0.55 U	0.6 U	0.6 U	0.57 U	0.58 U	0.59 U	0.56 U
Hexachloroethane	NS	0.18 U	0.81 U	0.15 U	0.17 U	0.17 U	0.16 U	0.16 U	0.16 U	0.16 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	0.16 J	0.18 J	0.27	**0.78**	0.072 J	0.34	**0.58**	0.16 U	**3.1**
Isophorone	NS	0.2 U	0.91 U	0.17 U	0.19 U	0.19 U	0.18 U	0.18 U	0.18 U	0.18 U
Naphthalene	100	0.46	0.86 J	0.18 J	0.17 J	0.16 J	1.7	0.11 J	0.031 J	0.3
Nitrobenzene	NS	0.2 U	0.91 U	0.17 U	0.19 U	0.19 U	0.18 U	0.18 U	0.18 U	0.18 U
N-Nitrosodi-N-Propylamine	NS	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
N-Nitrosodiphenylamine	NS	0.18 U	0.81 U	0.15 U	0.17 U	0.17 U	0.16 U	0.16 U	0.16 U	0.16 U
Pentachlorophenol	6.7	0.18 U	0.81 U	0.15 U	0.17 U	0.17 U	0.16 U	0.16 U	0.16 U	0.16 U
Phenanthrene	100	0.4	0.26 J	0.4	0.21	0.11 J	0.16	0.59	0.047 J	5
Phenol	100	0.22 U	1 U	0.19 U	0.21 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U
Pyrene	100	0.78	0.51 J	0.65	1	0.17	1.1	1.3	0.056 J	7.5

Table 1B
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
SVOCs

	AKRF Sample ID	EXA-S-08022018	EXA-W-08022018	EXA-W-08022018	EXB-E1-09132018	EXB-E2-09132018	EXB-N-08012018	EXB-N1-09042018	EXB-N2-09132018	EXB-W1-09042018
	Laboratory Sample ID	L1830132-01	L1830132-02	L1830132-02	L1836384-03	L1836384-04	L1829730-03	L1834890-01	L1836384-01	L1834890-03
	Date Sampled	8/2/2018 11:05:00 AM	8/2/2018 11:05:00 AM	8/2/2018 11:05:00 AM	9/13/2018 10:40:00 AM	9/13/2018 10:45:00 AM	8/1/2018 11:00:00 AM	9/4/2018 1:30:00 PM	9/13/2018 1:00:00 PM	9/4/2018 2:30:00 PM
	Dilution Factor	2	2	10	1	1	1	5	1	5
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 UJ	0.97 U
2,4,5-Trichlorophenol	NS	NA	0.44 U	NA	0.19 U	0.21 R	0.2 U	1.3 U	0.19 U	0.97 U
2,4,6-Trichlorophenol	NS	NA	0.26 U	NA	0.12 U	0.12 R	0.12 U	0.81 U	0.11 U	0.58 U
2,4-Dichlorophenol	NS	NA	0.4 U	NA	0.17 U	0.19 R	0.18 U	1.2 U	0.17 U	0.87 U
2,4-Dimethylphenol	NS	NA	0.44 U	NA	0.19 U	0.21 R	0.2 U	1.3 U	0.19 U	0.97 U
2,4-Dinitrophenol	NS	NA	2.1 U	NA	0.92 U	1 R	0.94 U	6.5 U	0.9 U	4.6 U
2,4-Dinitrotoluene	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
2,6-Dinitrotoluene	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
2-Chloronaphthalene	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
2-Chlorophenol	NS	NA	0.44 U	NA	0.19 U	0.21 R	0.2 U	1.3 U	0.19 U	0.97 U
2-Methylnaphthalene	NS	NA	14	NA	0.18 J	0.31	1.6	1.6 U	0.044 J	1.8
2-Methylphenol (O-Cresol)	100	NA	0.44 U	NA	0.19 U	0.21 R	0.2 U	1.3 U	0.19 U	0.97 U
2-Nitroaniline	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
2-Nitrophenol	NS	NA	0.95 U	NA	0.42 U	0.45 U	0.42 U	2.9 U	0.4 U	2.1 U
3- And 4- Methylphenol (Total)	NS	NA	0.13 J	NA	0.28 U	0.057 J	0.13 J	1.9 U	0.27 U	1.4 U
3,3'-Dichlorobenzidine	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
4,6-Dinitro-2-Methylphenol	NS	NA	1.1 U	NA	0.5 U	0.54 R	0.51 U	3.5 U	0.49 U	2.5 U
4-Bromophenyl Phenyl Ether	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
4-Chloro-3-Methylphenol	NS	NA	0.44 U	NA	0.19 U	0.21 R	0.2 U	1.3 U	0.19 U	0.97 U
4-Chloroaniline	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
4-Chlorophenyl Phenyl Ether	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
4-Nitroaniline	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
4-Nitrophenol	NS	NA	0.62 U	NA	0.27 U	0.29 R	0.28 U	1.9 U	0.26 U	1.4 U
Acenaphthene	100	NA	6.6	NA	0.33	0.31	0.69	5.6	0.1 J	2.3
Acenaphthylene	100	NA	4.2	NA	0.15 U	0.14 J	0.16 U	1.1 U	0.23	0.78 U
Acetophenone	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Anthracene	100	NA	5.4	NA	0.23	0.31	0.41	3.2	0.56	1.2
Benzo(a)Anthracene	**1**	NA	**5.6**	NA	0.13	0.69	0.11 J	0.53 J	**1.2**	0.42 J
Benzo(a)Pyrene	**1**	NA	**5.5**	NA	0.14 J	0.79	0.097 J	0.37 J	0.92	0.31 J
Benzo(b)Fluoranthene	**1**	NA	**6.5**	NA	0.17	0.77	0.11 J	0.47 J	1	0.42 J
Benzo(g,h,i)Perylene	100	NA	3.6	NA	0.094 J	0.53	0.078 J	0.23 J	0.47	0.18 J
Benzo(k)Fluoranthene	**3.9**	NA	1.7	NA	0.052 J	0.26	0.034 J	0.81 U	0.33	0.58 U
Benzoic Acid	NS	NA	1.4 U	NA	0.62 U	0.68 R	0.64 U	4.4 U	0.61 U	3.1 U
Benzyl Alcohol	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Benzyl Butyl Phthalate	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Biphenyl (Diphenyl)	NS	NA	3.2	NA	0.44 U	0.083 J	0.45 U	3.1 U	0.43 U	2.2 U
Bis(2-Chloroethoxy) Methane	NS	NA	0.48 U	NA	0.21 U	0.22 U	0.21 U	1.4 U	0.2 U	1 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	NA	0.4 U	NA	0.17 U	0.19 U	0.18 U	1.2 U	0.17 U	0.87 U
Bis(2-Chloroisopropyl) Ether	NS	NA	0.53 U	NA	0.23 U	0.25 U	0.24 U	1.6 U	0.22 U	1.2 U
Bis(2-Ethylhexyl) Phthalate	NS	NA	0.23 J	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Carbazole	NS	NA	0.85	NA	0.19 U	0.1 J	0.2 U	1.3 U	0.19 U	0.97 U
Chrysene	**3.9**	NA	**5.5**	NA	0.13	0.66	0.15	0.59 J	1.1	0.45 J
Dibenz(a,h)Anthracene	**0.33**	NA	**0.92**	NA	0.12 U	0.08 J	0.12 U	0.81 U	0.11	0.58 U
Dibenzofuran	59	NA	1.8	NA	0.3	0.084 J	0.49	4	0.071 J	1.7
Diethyl Phthalate	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Dimethyl Phthalate	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Di-N-Butyl Phthalate	NS	NA	0.44 U	NA	0.19 U	0.084 J	0.2 U	1.3 U	0.19 U	0.97 U
Di-N-Octylphthalate	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Fluoranthene	100	11 D	11	NA	0.27	1.4	0.28	1.8	2.2	1.4
Fluorene	100	NA	5.2	NA	0.84	0.23	1.3	11	0.38	4.3
Hexachlorobenzene	1.2	NA	0.26 U	NA	0.12 U	0.12 U	0.12 U	0.81 U	0.11 U	0.58 U
Hexachlorobutadiene	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
Hexachlorocyclopentadiene	NS	NA	1.3 U	NA	0.55 U	0.6 U	0.56 U	3.8 U	0.54 U	2.8 U
Hexachloroethane	NS	NA	0.35 U	NA	0.15 U	0.17 U	0.16 U	1.1 U	0.15 U	0.78 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	NA	**3.6**	NA	0.095 J	0.48	0.072 J	0.22 J	0.46	0.2 J
Isophorone	NS	NA	0.4 U	NA	0.17 U	0.19 U	0.18 U	1.2 U	0.17 U	0.87 U
Naphthalene	100	NA	NA	67 D	0.25	1.1	0.34	2.5	0.068 J	1.2
Nitrobenzene	NS	NA	0.4 U	NA	0.17 U	0.19 U	0.18 U	1.2 U	0.17 U	0.87 U
N-Nitrosodi-N-Propylamine	NS	NA	0.44 U	NA	0.19 U	0.21 U	0.2 U	1.3 U	0.19 U	0.97 U
N-Nitrosodiphenylamine	NS	NA	0.35 U	NA	0.15 U	0.17 U	0.16 U	1.1 U	0.15 U	0.78 U
Pentachlorophenol	6.7	NA	0.35 U	NA	0.15 U	0.17 R	0.16 U	1.1 U	0.15 U	0.78 U
Phenanthrene	100	NA	NA	25 D	0.62	1	2	22	0.17	9.4
Phenol	100	NA	0.094 J	NA	0.19 U	0.21 R	0.2 U	1.3 U	0.19 U	0.97 U
Pyrene	100	NA	12	NA	0.41	1.6	0.64	3.8	3.3	2.1

Table 1B
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
SVOCs

	AKRF Sample ID	EXB-W2-09132018	EXC-B-09112018	EXC-E-09112018	EXC-N-09112018	EXC-S-09112018	EXC-W-09112018	EXD-B-09052018	EXD-E1-09052018	EXD-E2-09052018
	Laboratory Sample ID	L1836384-02	L1836132-01	L1836132-04	L1836132-02	L1836132-03	L1836132-05	L1835198-06	L1835198-01	L1835198-02
	Date Sampled	9/13/2018 1:05:00 PM	9/11/2018 10:20:00 AM	9/11/2018 10:10:00 AM	9/11/2018 10:00:00 AM	9/11/2018 10:05:00 AM	9/11/2018 10:15:00 AM	9/5/2018 2:05:00 PM	9/5/2018 1:45:00 PM	9/5/2018 1:50:00 PM
	Dilution Factor	1	1	2	2	1	2	1	1	1
	Unit	mg/kg	ug/L	mg/kg	mg/kg	mg/kg	mg/kg	ug/L	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	0.19 U	10 U	0.4 U	0.38 U	0.19 U	0.39 U	9.8 U	0.21 U	0.21 U
2,4,5-Trichlorophenol	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
2,4,6-Trichlorophenol	NS	0.11 U	5 U	0.24 U	0.23 U	0.12 U	0.24 U	4.9 U	0.12 U	0.12 U
2,4-Dichlorophenol	NS	0.17 U	5 U	0.36 U	0.34 U	0.17 U	0.35 U	4.9 U	0.19 U	0.19 U
2,4-Dimethylphenol	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
2,4-Dinitrophenol	NS	0.91 U	20 U	1.9 U	1.8 U	0.92 U	1.9 U	20 U	0.99 U	1 U
2,4-Dinitrotoluene	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
2,6-Dinitrotoluene	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
2-Chloronaphthalene	NS	0.19 U	0.2 U	0.4 U	0.38 U	0.19 U	0.39 U	0.22 U	0.21 U	0.21 U
2-Chlorophenol	NS	0.19 U	2 U	0.4 U	0.38 U	0.19 U	0.39 U	2 U	0.21 U	0.21 U
2-Methylnaphthalene	NS	0.089 J	0.35	0.51	0.068 J	0.07 J	0.052 J	0.15	0.25 U	0.06 J
2-Methylphenol (O-Cresol)	100	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
2-Nitroaniline	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
2-Nitrophenol	NS	0.41 U	10 U	0.87 U	0.83 U	0.42 U	0.85 U	9.8 U	0.45 U	0.45 U
3- And 4- Methylphenol (Total)	NS	0.27 U	1.7 J	0.58 U	0.55 U	0.28 U	0.56 U	4.9 U	0.3 U	0.3 U
3,3'-Dichlorobenzidine	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 R
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
4,6-Dinitro-2-Methylphenol	NS	0.49 U	10 U	1 U	1 U	0.5 U	1 U	9.8 U	0.54 U	0.54 U
4-Bromophenyl Phenyl Ether	NS	0.19 U	2 U	0.4 U	0.38 U	0.19 U	0.39 U	2 U	0.21 U	0.21 U
4-Chloro-3-Methylphenol	NS	0.19 U	2 U	0.4 U	0.38 U	0.19 U	0.39 U	2 U	0.21 U	0.21 U
4-Chloroaniline	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
4-Chlorophenyl Phenyl Ether	NS	0.19 U	2 U	0.4 U	0.38 U	0.19 U	0.39 U	2 U	0.21 U	0.21 U
4-Nitroaniline	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
4-Nitrophenol	NS	0.26 U	10 U	0.56 U	0.54 U	0.27 U	0.55 U	9.8 U	0.29 U	0.29 U
Acenaphthene	100	0.62	0.47	0.21 J	0.044 J	0.034 J	0.12 J	0.23	0.16 U	0.17 U
Acenaphthylene	100	0.034 J	0.34	0.55	0.39	0.062 J	0.26 J	0.45	0.16 U	0.045 J
Acetophenone	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
Anthracene	100	0.084 J	0.65	0.68	0.3	0.093 J	0.46	0.74	0.12 U	0.042 J
Benzo(a)Anthracene	**1**	0.1 J	0.35	**2**	0.55	0.27	**1.4**	**1.6**	0.13	0.26
Benzo(a)Pyrene	**1**	0.1 J	0.35	**2.3**	0.65	0.24	**1.4**	**1.6**	0.12 J	0.27
Benzo(b)Fluoranthene	**1**	0.12	0.5	**2.8**	0.8	0.32	**1.9**	**2.2**	0.17	0.28
Benzo(g,h,i)Perylene	100	0.069 J	0.32	1.5	0.49	0.17	0.99	1.2	0.088 J	0.18
Benzo(k)Fluoranthene	**3.9**	0.039 J	0.14	1	0.28	0.12	0.64	0.62	0.044 J	0.11 J
Benzoic Acid	NS	0.61 U	50 UJ	1.3 U	1.2 U	0.62 U	1.3 U	49 U	0.67 UJ	0.68 UJ
Benzyl Alcohol	NS	0.19 U	2 U	0.4 U	0.38 U	0.19 U	0.39 U	2 U	0.21 U	0.21 U
Benzyl Butyl Phthalate	NS	0.19 U	5 U	0.4 U	0.38 U	0.056 J	0.39 U	4.9 U	0.21 U	0.21 U
Biphenyl (Diphenyl)	NS	0.054 J	2 U	0.92 U	0.87 U	0.44 U	0.89 U	2 U	0.47 U	0.48 U
Bis(2-Chloroethoxy) Methane	NS	0.2 U	5 U	0.43 U	0.41 U	0.21 U	0.42 U	4.9 U	0.22 U	0.23 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	0.17 U	2 U	0.36 U	0.34 U	0.17 U	0.35 U	2 U	0.19 U	0.19 U
Bis(2-Chloroisopropyl) Ether	NS	0.23 U	2 U	0.48 U	0.46 U	0.23 U	0.47 U	2 U	0.25 U	0.25 U
Bis(2-Ethylhexyl) Phthalate	NS	0.19 U	0.94 J	0.24 J	0.38 U	0.19 U	0.39 U	2.9 U	0.21 U	0.21 U
Carbazole	NS	0.034 J	2 U	0.22 J	0.046 J	0.038 J	0.12 J	2 U	0.21 U	0.21 U
Chrysene	**3.9**	0.096 J	0.36	2.1	0.67	0.29	1.4	1.6	0.14	0.26
Dibenz(a,h)Anthracene	**0.33**	0.11 U	0.07 J	**0.36**	0.13 J	0.044 J	0.23 J	0.29	0.12 U	0.038 J
Dibenzofuran	59	0.1 J	2 U	0.16 J	0.38 U	0.026 J	0.064 J	2 U	0.21 U	0.21 U
Diethyl Phthalate	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
Dimethyl Phthalate	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
Di-N-Butyl Phthalate	NS	0.19 U	5 U	0.096 J	0.38 U	0.19 U	0.26 J	4.9 U	0.21 U	0.21 U
Di-N-Octylphthalate	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
Fluoranthene	100	0.26	0.69	3.6	0.78	0.53	2.5	2.8	0.25	0.4
Fluorene	100	0.29	0.25	0.27 J	0.097 J	0.037 J	0.11 J	0.25	0.21 U	0.21 U
Hexachlorobenzene	1.2	0.11 U	0.8 U	0.24 U	0.23 U	0.12 U	0.24 U	0.87 U	0.12 U	0.12 U
Hexachlorobutadiene	NS	0.19 U		0.4 U	0.38 U	0.19 U	0.39 U	NA	0.21 U	0.21 U
Hexachlorocyclopentadiene	NS	0.54 U	20 U	1.1 U	1.1 U	0.55 U	1.1 U	20 U	0.59 U	0.6 R
Hexachloroethane	NS	0.15 U	0.8 U	0.32 U	0.31 U	0.15 U	0.31 U	0.87 U	0.16 U	0.17 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	0.06 J	0.26	**1.6**	0.46	0.17	**1**	**1.1**	0.086 J	0.19
Isophorone	NS	0.17 U	5 U	0.36 U	0.34 U	0.17 U	0.35 U	4.9 U	0.19 U	0.19 U
Naphthalene	100	0.1 J		0.46	0.088 J	0.076 J	0.073 J	NA	0.026 J	0.065 J
Nitrobenzene	NS	0.17 U	2 U	0.36 U	0.34 U	0.17 U	0.35 U	2 U	0.19 U	0.19 U
N-Nitrosodi-N-Propylamine	NS	0.19 U	5 U	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
N-Nitrosodiphenylamine	NS	0.15 U	2 U	0.32 U	0.31 U	0.15 U	0.31 U	2 U	0.16 U	0.17 U
Pentachlorophenol	6.7	0.15 U	0.8 U	0.32 U	0.31 U	0.15 U	0.31 U	0.61 J	0.16 U	0.17 U
Phenanthrene	100	0.47	0.42	2.2	0.37	0.34	1.2	1.5	0.16	0.16
Phenol	100	0.19 U	36	0.4 U	0.38 U	0.19 U	0.39 U	4.9 U	0.21 U	0.21 U
Pyrene	100	0.29	0.69	3.4	0.85	0.49	2.3	2.9	0.24	0.45

	AKRF Sample ID	EXD-N1-09062018	EXD-S1-09052018	EXD-DUP-09052018	EXD-S2-09052018	EXD-W1-09062018	EXD-W2-09062018	EXE-B-08272018	EXE-E-08272018	EXE-N-08272018
	Laboratory Sample ID	L1835198-08	L1835198-03	L1835198-05	L1835198-04	L1835198-09	L1835198-10	L1833887-01	L1833887-03	L1833887-02
	Date Sampled	9/6/2018 8:20:00 AM	9/5/2018 1:55:00 PM	9/5/2018 2:00:00 PM	9/5/2018 2:00:00 PM	9/6/2018 8:30:00 AM	9/6/2018 8:25:00 AM	8/27/2018 2:00:00 PM	8/27/2018 2:10:00 PM	8/27/2018 2:05:00 PM
	Dilution Factor	10	5	1	1	1	1	1	4	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2,4,5-Trichlorophenol	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2,4,6-Trichlorophenol	NS	1.2 U	0.6 U	0.16 U	0.12 U	0.13 U	0.11 U	0.13 U	0.48 U	0.11 U
2,4-Dichlorophenol	NS	1.8 U	0.89 U	0.24 U	0.17 U	0.19 U	0.16 U	0.2 U	0.71 U	0.17 U
2,4-Dimethylphenol	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2,4-Dinitrophenol	NS	9.4 U	4.8 U	1.3 R	0.92 R	1 U	0.88 U	1.1 U	3.8 R	0.91 U
2,4-Dinitrotoluene	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2,6-Dinitrotoluene	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2-Chloronaphthalene	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2-Chlorophenol	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2-Methylnaphthalene	NS	2.4 U	0.76 J	0.09 J	0.16 J	0.28	0.061 J	1.7	0.33 J	0.56
2-Methylphenol (O-Cresol)	100	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2-Nitroaniline	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
2-Nitrophenol	NS	4.2 U	2.1 U	0.57 U	0.41 U	0.46 U	0.4 U	0.48 U	1.7 U	0.41 U
3- And 4- Methylphenol (Total)	NS	2.8 U	0.29 J	0.089 J	0.12 J	0.34	0.048 J	0.32 U	1.1 U	0.27 U
3,3'-Dichlorobenzidine	NS	2 U	0.99 U	0.26 R	0.19 U	0.21 U	0.18 U	0.22 U	0.79 UJ	0.19 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
4,6-Dinitro-2-Methylphenol	NS	5.1 U	2.6 U	0.68 R	0.5 R	0.56 U	0.48 U	0.58 U	2.1 R	0.49 U
4-Bromophenyl Phenyl Ether	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
4-Chloro-3-Methylphenol	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
4-Chloroaniline	NS	2 U	0.99 U	0.26 UJ	0.19 UJ	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
4-Chlorophenyl Phenyl Ether	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
4-Nitroaniline	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 UJ	0.19 U
4-Nitrophenol	NS	2.7 U	1.4 U	0.37 R	0.27 R	0.3 U	0.26 U	0.31 U	1.1 UJ	0.26 U
Acenaphthene	100	0.3 J	0.54 J	0.21 U	0.25	0.27	0.069 J	0.057 J	2.1	2
Acenaphthylene	100	1.6 U	1.9	0.074 JL	0.38	0.55	0.16	1.1	0.25 J	1.4
Acetophenone	NS	2 U	0.99 U	0.26 U	0.19 U	0.046 J	0.18 U	0.22 U	0.79 U	0.19 U
Anthracene	100	0.73 J	3.9	0.096 JL	0.64	0.99	0.23	0.53	4.6	6.3
Benzo(a)Anthracene	**1**	**2.2**	**10**	0.27 JL	**1.3**	**2.5**	0.64	0.68	**8.1**	NA
Benzo(a)Pyrene	**1**	**1.8**	**11**	0.31 JL	**1.2**	**2.3**	0.61	**1.4**	**7.3**	NA
Benzo(b)Fluoranthene	**1**	**2.5**	**16**	0.41 JL	**1.6**	**3**	0.79	**2**	**9**	NA
Benzo(g,h,i)Perylene	100	1.2 J	16	0.27 JL	0.7	1.6	0.43	2.3	4.4	NA
Benzo(k)Fluoranthene	**3.9**	0.98 J	**4.3**	0.12 JL	0.47	0.84	0.24	0.65	3.2	3
Benzoic Acid	NS	6.4 UJ	1.9 J	0.85 R	0.62 R	0.69 UJ	0.6 UJ	0.72 U	2.6 R	0.61 U
Benzyl Alcohol	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Benzyl Butyl Phthalate	NS	42	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Biphenyl (Diphenyl)	NS	4.5 U	2.3 U	0.063 J	0.085 J	0.066 J	0.42 U	0.12 J	1.8 U	0.22 J
Bis(2-Chloroethoxy) Methane	NS	2.1 U	1.1 U	0.28 U	0.21 U	0.23 U	0.2 U	0.24 U	0.86 U	0.2 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	1.8 U	0.89 U	0.24 U	0.17 U	0.19 U	0.16 U	0.2 U	0.71 U	0.17 U
Bis(2-Chloroisopropyl) Ether	NS	2.4 U	1.2 U	0.32 U	0.23 U	0.26 U	0.22 U	0.26 U	0.95 U	0.23 U
Bis(2-Ethylhexyl) Phthalate	NS	4.9	0.51 J	0.26 U	0.19 U	0.077 J	0.18 U	0.22 U	0.79 U	0.19 U
Carbazole	NS	0.33 J	1.7	0.048 J	0.26	0.42	0.089 J	0.17 J	1	1.2
Chrysene	**3.9**	2.1	**10**	0.31 JL	1.4	2.4	0.64	0.8	**7.5**	NA
Dibenz(a,h)Anthracene	**0.33**	0.3 J	**2.4**	0.053 JL	0.17	**0.36**	0.1 J	**0.41**	**1**	**1.9**
Dibenzofuran	59	0.19 J	0.58 J	0.059 J	0.26	0.19 J	0.057 J	0.15 J	0.97 J	1.1
Diethyl Phthalate	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Dimethyl Phthalate	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Di-N-Butyl Phthalate	NS	0.85 J	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Di-N-Octylphthalate	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Fluoranthene	100	4.7	21	0.51 JL	3.8	5.8	1.4	0.76	22	NA
Fluorene	100	0.29 J	0.9 J	0.041 JL	0.34	0.32	0.092 J	0.22 U	1.7	1.7
Hexachlorobenzene	1.2	1.2 U	0.6 U	0.16 U	0.12 U	0.13 U	0.11 U	0.13 U	0.48 U	0.11 U
Hexachlorobutadiene	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Hexachlorocyclopentadiene	NS	5.6 U	2.8 U	0.75 R	0.55 U	0.61 U	0.52 U	0.63 U	2.3 R	0.54 U
Hexachloroethane	NS	1.6 U	0.79 U	0.21 U	0.15 U	0.17 U	0.15 U	0.18 U	0.63 U	0.15 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	**1.3 J**	**10**	0.26 JL	**0.77**	**1.6**	0.44	**2**	**4.8**	NA
Isophorone	NS	1.8 U	0.89 U	0.24 U	0.17 U	0.19 U	0.16 U	0.2 U	0.71 U	0.17 U
Naphthalene	100	0.3 J	0.94 J	0.23 JL	0.47	0.45	0.13 J	2.4	0.43 J	0.9
Nitrobenzene	NS	1.8 U	0.89 U	0.24 U	0.17 U	0.19 U	0.16 U	0.2 U	0.71 U	0.17 U
N-Nitrosodi-N-Propylamine	NS	2 U	0.99 U	0.26 U	0.19 U	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
N-Nitrosodiphenylamine	NS	1.6 U	0.79 U	0.21 U	0.15 U	0.17 U	0.15 U	0.18 U	0.63 U	0.15 U
Pentachlorophenol	6.7	1.6 U	0.79 U	0.21 U	0.15 U	0.17 U	0.15 U	0.18 U	0.63 U	0.15 U
Phenanthrene	100	2.7	11	0.35 JL	2.7	3.6	0.81	0.51	18	NA
Phenol	100	2 U	0.99 U	0.26 U	0.056 J	0.21 U	0.18 U	0.22 U	0.79 U	0.19 U
Pyrene	100	3.9	18	0.48 JL	3.3	5.6	1.3	0.84	18	NA

	AKRF Sample ID	EXE-N-08272018	EXE-DUPE-08272018	EXE-DUPE-08272018	EXE-S-08272018	EXE-S-08272018	UST-E-08012019	UST-N-08012019
	Laboratory Sample ID	L1833887-02	L1833887-05	L1833887-05	L1833887-04	L1833887-04	L1934191-03	L1934191-01
	Date Sampled	8/27/2018 2:05:00 PM	8/27/2018 2:15:00 PM	8/27/2018 2:15:00 PM	8/27/2018 2:15:00 PM	8/27/2018 2:15:00 PM	8/1/2019 7:50:00 AM	8/1/2019 7:40:00 AM
	Dilution Factor	5	1	2	1	2	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2,4,5-Trichlorophenol	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2,4,6-Trichlorophenol	NS	NA	0.12 U	NA	0.11 U	NA	0.13 U	0.12 U
2,4-Dichlorophenol	NS	NA	0.19 U	NA	0.17 U	NA	0.2 U	0.18 U
2,4-Dimethylphenol	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2,4-Dinitrophenol	NS	NA	1 R	NA	0.92 U	NA	1 U	0.93 U
2,4-Dinitrotoluene	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2,6-Dinitrotoluene	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2-Chloronaphthalene	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2-Chlorophenol	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2-Methylnaphthalene	NS	NA	0.32	NA	0.31	NA	0.2 J	0.13 J
2-Methylphenol (O-Cresol)	100	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2-Nitroaniline	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
2-Nitrophenol	NS	NA	0.45 U	NA	0.41 U	NA	0.47 U	0.42 U
3- And 4- Methylphenol (Total)	NS	NA	0.3 U	NA	0.28 U	NA	0.073 J	0.03 J
3,3'-Dichlorobenzidine	NS	NA	0.21 UJ	NA	0.19 U	NA	0.22 U	0.19 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
4,6-Dinitro-2-Methylphenol	NS	NA	0.54 R	NA	0.5 U	NA	0.57 U	0.5 U
4-Bromophenyl Phenyl Ether	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
4-Chloro-3-Methylphenol	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
4-Chloroaniline	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
4-Chlorophenyl Phenyl Ether	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
4-Nitroaniline	NS	NA	0.21 UJ	NA	0.19 U	NA	0.22 U	0.19 U
4-Nitrophenol	NS	NA	0.29 U	NA	0.27 U	NA	0.3 U	0.27 U
Acenaphthene	100	NA	0.73 JL	NA	0.52	NA	0.061 J	0.03 J
Acenaphthylene	100	NA	0.68 J	NA	0.46	NA	0.45	0.46
Acetophenone	NS	NA	0.21 U	NA	0.19 U	NA	0.039 J	0.032 J
Anthracene	100	NA	2.2 JL	NA	1.6	NA	0.36	0.3
Benzo(a)Anthracene	**1**	**15 D**	**5**	NA	**5.6**	NA	0.77	0.6
Benzo(a)Pyrene	**1**	**13 D**	**4.5**	NA	**5.1**	NA	1	0.58
Benzo(b)Fluoranthene	**1**	**16 D**	**6.5**	NA	**7.2**	NA	**1.1**	0.71
Benzo(g,h,i)Perylene	100	8 D	3.1	NA	3.7	NA	0.86	0.59
Benzo(k)Fluoranthene	**3.9**	NA	1.8	NA	2.1	NA	0.34	0.23
Benzoic Acid	NS	NA	0.68 R	NA	0.62 U	NA	0.71 U	0.63 U
Benzyl Alcohol	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Benzyl Butyl Phthalate	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Biphenyl (Diphenyl)	NS	NA	0.091 J	NA	0.06 J	NA	0.053 J	0.047 J
Bis(2-Chloroethoxy) Methane	NS	NA	0.23 U	NA	0.21 U	NA	0.24 U	0.21 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	NA	0.19 U	NA	0.17 U	NA	0.2 U	0.18 U
Bis(2-Chloroisopropyl) Ether	NS	NA	0.25 U	NA	0.23 U	NA	0.26 U	0.23 U
Bis(2-Ethylhexyl) Phthalate	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Carbazole	NS	NA	0.6	NA	0.42	NA	0.077 J	0.052 J
Chrysene	**3.9**	**14 D**	**5.1**	NA	**5.3**	NA	0.77	0.68
Dibenz(a,h)Anthracene	**0.33**	NA	**0.82**	NA	**0.93**	NA	0.19	0.11 J
Dibenzofuran	59	NA	0.41 JL	NA	0.27	NA	0.12 J	0.068 J
Diethyl Phthalate	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Dimethyl Phthalate	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Di-N-Butyl Phthalate	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Di-N-Octylphthalate	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Fluoranthene	100	36 D	NA	9.2 JLD	NA	10 D	1.2	0.9
Fluorene	100	NA	0.71 JL	NA	0.48	NA	0.092 J	0.09 J
Hexachlorobenzene	1.2	NA	0.12 U	NA	0.11 U	NA	0.13 U	0.12 U
Hexachlorobutadiene	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
Hexachlorocyclopentadiene	NS	NA	0.6 R	NA	0.55 U	NA	0.62 U	0.56 U
Hexachloroethane	NS	NA	0.17 U	NA	0.15 U	NA	0.17 U	0.16 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	**8.8 D**	**3.4**	NA	**4**	NA	**0.88**	0.46
Isophorone	NS	NA	0.19 U	NA	0.17 U	NA	0.2 U	0.18 U
Naphthalene	100	NA	0.59	NA	0.52	NA	0.42	0.39
Nitrobenzene	NS	NA	0.19 U	NA	0.17 U	NA	0.2 U	0.18 U
N-Nitrosodi-N-Propylamine	NS	NA	0.21 U	NA	0.19 U	NA	0.22 U	0.19 U
N-Nitrosodiphenylamine	NS	NA	0.17 U	NA	0.15 U	NA	0.17 U	0.16 U
Pentachlorophenol	6.7	NA	0.17 U	NA	0.15 U	NA	0.17 U	0.16 U
Phenanthrene	100	25 D	7.6 JL	NA	6.6	NA	1.2	0.7
Phenol	100	NA	0.043 J	NA	0.19 U	NA	0.22 U	0.19 U
Pyrene	100	30 D	NA	7.4 JLD	NA	8.2 D	1.1	0.94

Table 1B
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
SVOCs

	AKRF Sample ID	UST-S-08012019	UST-W-08012019	UST-E-05302019	UST-N-05302019	UST-S-05302019	UST-W-05302019
	Laboratory Sample ID	L1934191-02	L1934191-04	L1922866-02	L1922866-01	L1922866-03	L1922866-04
	Date Sampled	8/1/2019 7:45:00 AM	8/1/2019 7:55:00 AM	5/30/2019 7:20:00 AM	5/30/2019 7:15:00 AM	5/30/2019 7:25:00 AM	5/30/2019 7:30:00 AM
	Dilution Factor	1	1	20	20	10	5
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
1,2,4,5-Tetrachlorobenzene	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2,4,5-Trichlorophenol	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2,4,6-Trichlorophenol	NS	0.12 U	0.14 U	2.6 U	2.5 U	1.2 U	0.63 U
2,4-Dichlorophenol	NS	0.18 U	0.21 U	3.9 U	3.8 U	1.8 U	0.95 U
2,4-Dimethylphenol	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2,4-Dinitrophenol	NS	0.95 U	1.1 U	21 U	20 U	9.6 U	5.1 U
2,4-Dinitrotoluene	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2,6-Dinitrotoluene	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2-Chloronaphthalene	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2-Chlorophenol	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2-Methylnaphthalene	NS	0.18 J	0.17 J	9.2	5.1 U	0.77 J	7.3
2-Methylphenol (O-Cresol)	100	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2-Nitroaniline	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
2-Nitrophenol	NS	0.43 U	0.5 U	9.4 U	9.1 U	4.3 U	2.3 U
3- And 4- Methylphenol (Total)	NS	0.28 U	0.33 U	6.3 U	6.1 U	2.9 U	1.5 U
3,3'-Dichlorobenzidine	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
3-Methylphenol/4-Methylphenol	NS	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
4,6-Dinitro-2-Methylphenol	NS	0.51 U	0.6 U	11 U	11 U	5.2 U	2.7 U
4-Bromophenyl Phenyl Ether	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
4-Chloro-3-Methylphenol	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
4-Chloroaniline	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
4-Chlorophenyl Phenyl Ether	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
4-Nitroaniline	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
4-Nitrophenol	NS	0.28 U	0.32 U	6.1 U	5.9 U	2.8 U	1.5 U
Acenaphthene	100	0.073 J	0.035 J	5.6	4.3	1.3 J	3.9
Acenaphthylene	100	1.7	1.2	3.5 U	1.1 J	1.6 U	0.84 U
Acetophenone	NS	0.052 J	0.055 J	4.4 U	4.2 U	2 U	1 U
Anthracene	100	0.5	0.28	4	3.5	0.79 J	2.3
Benzo(a)Anthracene	**1**	**2.8**	**1.6**	1.4 J	3	0.34 J	0.88
Benzo(a)Pyrene	**1**	**3.3**	**1.8**	3.5 U	2.2 J	1.6 U	0.58 J
Benzo(b)Fluoranthene	**1**	**5.1**	**2.8**	1 J	2.8	1.2 U	0.8
Benzo(g,h,i)Perylene	100	3.9	2.4	3.5 U	1.1 J	1.6 U	0.39 J
Benzo(k)Fluoranthene	**3.9**	1.2	0.83	2.6 U	0.8 J	1.2 U	0.24 J
Benzoic Acid	NS	0.64 U	0.75 U	14 U	14 U	6.5 U	3.4 U
Benzyl Alcohol	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Benzyl Butyl Phthalate	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Biphenyl (Diphenyl)	NS	0.06 J	0.063 J	10 U	9.6 U	4.6 U	0.53 J
Bis(2-Chloroethoxy) Methane	NS	0.21 U	0.25 U	4.7 U	4.6 U	2.2 U	1.1 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	NS	0.18 U	0.21 U	3.9 U	3.8 U	1.8 U	0.95 U
Bis(2-Chloroisopropyl) Ether	NS	0.24 U	0.28 U	5.2 U	5.1 U	2.4 U	1.3 U
Bis(2-Ethylhexyl) Phthalate	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Carbazole	NS	0.1 J	0.063 J	4.6	4.2 U	2 U	1 U
Chrysene	**3.9**	2.4	1.4	1.4 J	2.6	0.3 J	0.91
Dibenz(a,h)Anthracene	**0.33**	**0.68**	**0.37**	2.6 U	2.5 U	1.2 U	0.63 U
Dibenzofuran	59	0.083 J	0.056 J	7.3	3.9 J	1.5 J	3.6
Diethyl Phthalate	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Dimethyl Phthalate	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Di-N-Butyl Phthalate	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Di-N-Octylphthalate	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Fluoranthene	100	3.2	1.7	3.7	8.3	0.79 J	1.9
Fluorene	100	0.12 J	0.074 J	16	7.9	3.2	9.8
Hexachlorobenzene	1.2	0.12 U	0.14 U	2.6 U	2.5 U	1.2 U	0.63 U
Hexachlorobutadiene	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Hexachlorocyclopentadiene	NS	0.56 U	0.66 U	12 U	12 U	5.7 U	3 U
Hexachloroethane	NS	0.16 U	0.18 U	3.5 U	3.4 U	1.6 U	0.84 U
Indeno(1,2,3-c,d)Pyrene	**0.5**	**3.5**	**2.1**	1.3 J	2 J	0.57 J	0.4 J
Isophorone	NS	0.18 U	0.21 U	3.9 U	3.8 U	1.8 U	0.95 U
Naphthalene	100	0.44	0.28	10	2.2 J	1.1 J	5.6
Nitrobenzene	NS	0.18 U	0.21 U	3.9 U	3.8 U	1.8 U	0.95 U
N-Nitrosodi-N-Propylamine	NS	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
N-Nitrosodiphenylamine	NS	0.16 U	0.18 U	3.5 U	3.4 U	1.6 U	0.84 U
Pentachlorophenol	6.7	0.16 U	0.18 U	3.5 U	3.4 U	1.6 U	0.84 U
Phenanthrene	100	1.2	0.63	30	20	3.4	1.9
Phenol	100	0.2 U	0.23 U	4.4 U	4.2 U	2 U	1 U
Pyrene	100	3.9	2.4	5.6	8.1	1.2	3.3

Table 1C
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
Metals

	AKRF Sample ID	EX10-B-07272018	EX10-E-07272018	EX12-E-07262018	EX12-E2-09142018	EX12-N-07262018	EX12-N2-09142018	EX12-W-07252018	EX 2-E-08302019
	Laboratory Sample ID	L1829172-15	L1829172-14	L1829172-03	L1836603-02	L1829172-02	L1836603-01	L1829172-01	L1939673-03
	Date Sampled	7/27/2018 2:05:00 PM	7/27/2018 2:00:00 PM	7/26/2018 6:30:00 AM	9/14/2018 8:35:00 AM	7/26/2018 6:40:00 AM	9/14/2018 8:30:00 AM	7/25/2018 10:30:00 AM	8/30/2019 11:20:00 AM
	Dilution Factor	1	1	50	1	50	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
Arsenic	**16**	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	NS	NA	NA	NA	NA	NA	NA	NA	NA
Copper	270	104	47.2	NA	NA	NA	NA	NA	NA
Lead	**400**	NA	NA	NA	133	NA	**440**	NA	NA
Mercury	**0.81**	NA	NA	**53.9**	NA	**45.5**	NA	**2.71**	**1.02**

Table 1C
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
Metals

	AKRF Sample ID	EX 2-N-08302019	EX 2-S-08302019	EX 2-W-08302019	EX3-S2-09122018	EX3-W2-09132018	EX3-DUPE-05242019	EX3-W4-05242019
	Laboratory Sample ID	L1939673-01	L1939673-02	L1939673-04	L1836198-02	L1836384-07	L1922115-02	L1922115-01
	Date Sampled	8/30/2019 11:00:00 AM	8/30/2019 11:10:00 AM	8/30/2019 11:30:00 AM	9/12/2018 11:25:00 AM	9/13/2018 1:15:00 PM	5/24/2019	5/24/2019 10:30:00 AM
	Dilution Factor	1	20	1	1	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
Arsenic	**16**	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	NS	NA	NA	NA	22.3	1,730	47.5	63.7
Copper	270	NA	NA	NA	NA	NA	NA	NA
Lead	**400**	NA	NA	NA	NA	NA	NA	NA
Mercury	**0.81**	**0.986**	**5.21 D**	**2.1**	**1.15**	**1.32**	NA	NA

Table 1C
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
Metals

	AKRF Sample ID	EX4-B-08012018	EX4-N1-09112018	EX5-E-07302018	EX5-N-07302018	EX5-W-07302018	EX6-B-07302018	EX6-N-07302018
	Laboratory Sample ID	L1829730-04	L1836132-07	L1829306-02	L1829306-01	L1829306-03	L1829306-06	L1829306-05
	Date Sampled	8/1/2018 10:00:00 AM	9/11/2018 12:20:00 PM	7/30/2018 12:05:00 PM	7/30/2018 12:00:00 PM	7/30/2018 12:10:00 PM	7/30/2018 12:35:00 PM	7/30/2018 12:30:00 PM
	Dilution Factor	1	1	1	1	1	5	5
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
Arsenic	**16**	NA	NA	**17**	6.74	14.8	NA	NA
Chromium, Total	NS	NA	NA	NA	NA	NA	NA	NA
Copper	270	47	28.1	NA	NA	NA	NA	NA
Lead	**400**	NA	NA	NA	NA	NA	NA	NA
Mercury	**0.81**	NA	NA	NA	NA	NA	**4.71**	**6.23**

Table 1C
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
Metals

	AKRF Sample ID	EX7-B-07262018	EX7-N-07262018	EX8-E1-07272018	EX8-E1-07272018	EX8-E2-07272018	EX8-N-07272018	EX8-S-07272018
	Laboratory Sample ID	L1829172-05	L1829172-04	L1829172-08	L1829172-08	L1829172-10	L1829172-07	L1829172-06
	Date Sampled	7/26/2018 8:40:00 AM	7/26/2018 8:30:00 AM	7/27/2018 9:50:00 AM	7/27/2018 9:50:00 AM	7/27/2018 10:00:00 AM	7/27/2018 9:45:00 AM	7/27/2018 9:40:00 AM
	Dilution Factor	1	1	1	5	1	1	1
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
Arsenic	**16**	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	NS	NA	NA	NA	NA	NA	NA	NA
Copper	270	43.2	156 J	NA	NA	NA	NA	NA
Lead	**400**	62.8	**452 J**	38.2	NA	39.2	30.3	6.64
Mercury	**0.81**	**1.4**	0.514	NA	**6.02**	0.416	**1.68**	0.096

Table 1C
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
Metals

	AKRF Sample ID	EX8-W1-07272018	EX8-W2-07272018	EX9-B-07272018	EX9-N-07272018	EX9-N2-09142018	EXB-N-08012018	EXB-N1-09042018
	Laboratory Sample ID	L1829172-09	L1829172-11	L1829172-17	L1829172-16	L1836603-03	L1829730-03	L1834890-01
	Date Sampled	7/27/2018 9:55:00 AM	7/27/2018 10:05:00 AM	7/27/2018 2:50:00 PM	7/27/2018 2:45:00 PM	9/14/2018 11:00:00 AM	8/1/2018 11:00:00 AM	9/4/2018 1:30:00 PM
	Dilution Factor	1	1	1	1	1	2	20
	Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Compound	**NYSDEC RRSCO**	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q	Conc Q
Arsenic	**16**	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	NS	NA	NA	NA	NA	NA	NA	NA
Copper	270	NA	NA	NA	NA	NA	NA	NA
Lead	**400**	61.3	30.4	26.3	**1,210**	NA	NA	NA
Mercury	**0.81**	0.631	0.121	NA	NA	**1.24**	**3.1**	**58.4 J**

Table 1A-1C
Site Management Plan
Polychrome East (BCP No. C360098)
Soil Endpoint UST Sample Analytical Results
Notes

GENERAL

D :	Result is from an analysis that required a dilution.
J :	The concentration given is an estimated value.
L :	Sample result is estimated and biased low.
NA :	Not applicable.
NS :	No standard.
R :	Indicates the reported result is unusable. (note: the analyte may or may not be present.)
U :	The analyte was not detected at the indicated concentration.
mg/kg :	milligrams per kilogram = parts per million (ppm)

STANDARDS

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

Exceedances of Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs) are highlighted in bold font.

Table 2A
Site Management Plan
Polychrome East (BCP No. C360098)
Baseline Groundwater Sample Analytical Results
VOCs

AKRF Sample ID		PCE-MW-A-20191011	PCE-MW-B-20191011	PCE-MW-C-20191015	PCE-MW-D-20191015	PCE-MW-X-20191015	PCE-MW-X-20191015	Field Blank-20191011	TRIPBLANK-20191015
Laboratory Sample ID		L1947800-03	L1947800-02	L1948207-01	L1948207-02	L1948207-03	L1948207-03	L1947800-01	L1948207-06
Date Sampled		10/11/2019 1:00:00 PM	10/11/2019 11:25:00 AM	10/15/2019 11:38:00 AM	10/15/2019 1:12:00 PM	10/15/2019	10/15/2019	10/11/2019 10:15:00 AM	10/15/2019
Unit		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Dilution Factor		2	1	1	5	5	20	1	1
Compound	**AWQSGV**	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q
1,1,1,2-Tetrachloroethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,1,1-Trichloroethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
1,1,2-Trichloroethane	1	3 U	1.5 U	1.5 U	7.5 U	7.5 U	NT	1.5 U	1.5 U
1,1-Dichloroethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,1-Dichloroethene	5	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
1,1-Dichloropropene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,2,3-Trichlorobenzene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,2,3-Trichloropropane	0.04	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,2,4,5-Tetramethylbenzene	5	4 UJ	1.8 J	0.74 J	10 U	10 U	NT	2 UJ	2 U
1,2,4-Trichlorobenzene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,2,4-Trimethylbenzene	**5**	1.5 J	2.5 U	2.5 U	**5.7 JK**	**5.7 J**	NT	2.5 U	2.5 U
1,2-Dibromo-3-Chloropropane	0.04	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	4 U	2 U	2 U	10 U	10 U	NT	2 U	2 U
1,2-Dichlorobenzene	3	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,2-Dichloroethane	0.6	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
1,2-Dichloropropane	1	2 U	1 U	1 U	5 U	5 U	NT	1 U	1 U
1,3,5-Trimethylbenzene (Mesitylene)	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,3-Dichlorobenzene	3	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,3-Dichloropropane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,4-Dichlorobenzene	3	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
1,4-Diethyl Benzene	NS	4 U	2 U	2 U	10 U	10 U	NT	2 U	2 U
2,2-Dichloropropane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
2-Chlorotoluene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
2-Hexanone	50	10 U	5 U	5 U	25 U	25 U	NT	5 U	5 U
4-Chlorotoluene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
4-Ethyltoluene	NS	4 U	2 U	2 UJ	4 JK	4.1 J	NT	2 U	2 UJ
Acetone	50	16	5 U	5 U	28	24 J	NT	5 U	5 U
Acrylonitrile	5	10 U	5 U	5 R	25 R	25 R	NT	5 U	5 R
Benzene	**1**	0.76 J	0.64	0.21 J	**11**	**11**	NT	0.5 U	0.5 U
Bromobenzene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Bromochloromethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Bromodichloromethane	50	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Bromoform	50	4 U	2 U	2 U	10 U	10 U	NT	2 U	2 U
Bromomethane	5	5 UJ	2.5 UJ	2.5 U	12 U	12 U	NT	2.5 UJ	2.5 U
Carbon Disulfide	60	10 U	5 U	5 U	25 U	25 U	NT	5 U	5 U
Carbon Tetrachloride	5	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Chlorobenzene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Chloroethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Chloroform	7	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Chloromethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Cis-1,2-Dichloroethylene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Cis-1,3-Dichloropropene	NS	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Cymene	5	5 U	2.5 U	2.5 UJ	12 UJ	12 UJ	NT	2.5 U	2.5 UJ
Dibromochloromethane	50	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Dibromomethane	5	10 U	5 U	5 U	25 U	25 U	NT	5 U	5 U
Dichlorodifluoromethane	5	10 U	5 U	5 U	25 U	25 U	NT	5 U	5 U
Dichloroethylenes	NS	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Diethyl Ether (Ethyl Ether)	NS	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Ethylbenzene	**5**	5 U	2.5 U	2.5 U	**8.5 JK**	**8.5 J**	NT	2.5 U	2.5 U
Isopropylbenzene (Cumene)	5	5 U	2.2 J	2.5 UJ	12 UJ	12 UJ	NT	2.5 U	2.5 UJ
M,P-Xylenes	**5**	5 U	2.5 U	2.5 U	**12**	**13**	NT	2.5 U	2.5 U
Methyl Ethyl Ketone (2-Butanone)	50	6.4 J	5 U	5 U	25 U	25 U	NT	5 U	5 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	NS	10 U	5 U	5 U	25 U	25 U	NT	5 U	5 U
Methylene Chloride	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Naphthalene	10	16 J	0.73 J	2.5 UJ	1,000 J	NR	670 R	2.5 UJ	2.5 UJ
N-Butylbenzene	5	5 U	2.5 U	2.5 UJ	12 UJ	12 UJ	NT	2.5 U	2.5 UJ
N-Propylbenzene	5	5 U	2.5 U	2.5 UJ	12 UJ	12 UJ	NT	2.5 U	2.5 UJ
O-Xylene (1,2-Dimethylbenzene)	**5**	5 U	2.5 U	2.5 U	**6.1 J**	**6.3 J**	NT	2.5 U	2.5 U
Sec-Butylbenzene	5	5 U	2.5 U	2.5 UJ	12 UJ	12 UJ	NT	2.5 U	2.5 UJ
Styrene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
T-Butylbenzene	5	5 UJ	2.5 UJ	2.5 U	12 U	12 U	NT	2.5 UJ	2.5 U
Tert-Butyl Methyl Ether	10	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Tetrachloroethylene (PCE)	5	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Toluene	**5**	5 U	2.5 U	2.5 U	**10 JK**	**10 J**	NT	2.5 U	2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	0.4	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Trans-1,2-Dichloroethene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Trans-1,3-Dichloropropene	NS	1 U	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Trans-1,4-Dichloro-2-Butene	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Trichloroethylene (TCE)	5	0.69 J	0.5 U	0.5 U	2.5 U	2.5 U	NT	0.5 U	0.5 U
Trichlorofluoromethane	5	5 U	2.5 U	2.5 U	12 U	12 U	NT	2.5 U	2.5 U
Vinyl Acetate	NS	10 U	5 U	5 U	25 U	25 U	NT	5 U	5 U
Vinyl Chloride	2	2 U	1.4	1 U	5 U	5 U	NT	1 U	1 U
Xylenes, Total	NS	5 U	2.5 U	2.5 U	18 J	19 J	NT	2.5 U	2.5 U

Table 2B
Site Management Plan
Polychrome East (BCP No. C360098)
Baseline Groundwater Sample Analytical Results
SVOCs

AKRF Sample ID		PCE-MW-A-20191011	PCE-MW-B-20191011	PCE-MW-C-20191015	PCE-MW-D-20191015	PCE-MW-D-20191015	PCE-MW-D-20191015	PCE-MW-X-20191015	PCE-MW-X-20191015	PCE-MW-X-20191015	Field Blank-20191011
Laboratory Sample ID		L1947800-03	L1947800-02	L1948207-01	L1948207-02	L1948207-02	L1948207-02	L1948207-03	L1948207-03	L1948207-03	L1947800-01
Date Sampled		10/11/2019 1:00:00 PM	10/11/2019 11:25:00 AM	10/15/2019 11:38:00 AM	10/15/2019 1:12:00 PM	10/15/2019 1:12:00 PM	10/15/2019 1:12:00 PM	10/15/2019	10/15/2019	10/15/2019	10/11/2019 10:15:00 AM
Unit		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Dilution Factor		1	1	1	1	5	10	1	5	10	1
Compound	**AWQSGV**	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q
1,2,4,5-Tetrachlorobenzene	5	10 U	10 U	10 U	10 U	NT	NT	10 U	NT	NT	10 U
2,4,5-Trichlorophenol	NS	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
2,4,6-Trichlorophenol	NS	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
2,4-Dichlorophenol	5	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
2,4-Dimethylphenol	**50**	5 U	5 U	5 U	**52 JK**	NT	NT	**57 JK**	NT	NT	5 U
2,4-Dinitrophenol	10	20 U	20 U	20 U	20 U	NT	NT	20 U	NT	NT	20 U
2,4-Dinitrotoluene	5	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
2,6-Dinitrotoluene	5	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
2-Chloronaphthalene	10	0.2 U	0.2 U	0.2 U	NR	NT	2 U	NR	NT	2 U	0.2 U
2-Chlorophenol	NS	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
2-Methylnaphthalene	NS	0.05 J	0.1 U	0.07 J	NR	NT	1 UJ	NR	NT	2.4	0.1 U
2-Methylphenol (O-Cresol)	NS	5 U	5 U	5 U	60	NT	NT	64	NT	NT	5 U
2-Nitroaniline	5	5 U	5 U	5 U	5 UJ	NT	NT	5 UJ	NT	NT	5 U
2-Nitrophenol	NS	10 U	10 U	10 U	10 U	NT	NT	10 U	NT	NT	10 U
3,3'-Dichlorobenzidine	5	5 U	5 U	5 U	5 R	NT	NT	5 R	NT	NT	5 U
3-Methylphenol/4-Methylphenol	NS	5 U	5 U	5 U	160 JK	NT	NT	170 JK	NT	NT	5 U
3-Nitroaniline	5	5 U	5 U	5 U	5 U	NT	NT	5 UJ	NT	NT	5 U
4,6-Dinitro-2-Methylphenol	NS	10 U	10 U	10 U	10 U	NT	NT	10 U	NT	NT	10 U
4-Bromophenyl Phenyl Ether	NS	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
4-Chloro-3-Methylphenol	NS	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
4-Chloroaniline	5	5 U	5 U	5 U	5 UJ	NT	NT	5 UJ	NT	NT	5 U
4-Chlorophenyl Phenyl Ether	NS	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
4-Nitroaniline	5	5 U	5 U	5 U	5 UJ	NT	NT	5 UJ	NT	NT	5 U
4-Nitrophenol	NS	10 U	10 U	10 U	10 U	NT	NT	10 U	NT	NT	10 U
Acenaphthene	20	0.1 U	0.16	12	NR	NT	1 UJ	NR	NT	13	0.1 U
Acenaphthylene	NS	0.39	0.1 U	0.28	NR	NT	0.15 J	NR	NT	3.4 J	0.1 U
Acetophenone	NS	1 J	5 U	5 U	1.6 J	NT	NT	2 J	NT	NT	5 U
Anthracene	50	0.16	0.03 J	0.17	NR	NT	0.64 J	NR	NT	2.1 J	0.1 U
Benzo(a)Anthracene	**0.002**	**0.13**	**0.12**	**0.27**	NR	NT	**2.6**	NR	NT	**1.8**	0.1 U
Benzo(a)Pyrene	**ND**	**0.07 J**	**0.04 J**	**0.03 J**	NR	NT	**2.4 J**	NR	NT	**0.94 J**	0.1 U
Benzo(b)Fluoranthene	**0.002**	**0.08 J**	**0.05 J**	**0.03 J**	NR	NT	**3.2 J**	NR	NT	**1.5 J**	0.1 U
Benzo(g,h,i)Perylene	NS	0.04 J	0.1 U	0.02 J	NR	NT	1.4	NR	NT	0.68 J	0.1 U
Benzo(k)Fluoranthene	**0.002**	**0.03 J**	**0.02 J**	**0.02 J**	NR	NT	**1.1 J**	NR	NT	**0.48 J**	0.1 U
Benzoic Acid	NS	50 U	50 U	50 U	76 JK	NT	NT	92 JK	NT	NT	50 U
Benzyl Alcohol	NS	2 U	2 U	2 U	2.6	NT	NT	3	NT	NT	2 U
Benzyl Butyl Phthalate	50	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
Biphenyl (Diphenyl)	**5**	2 U	2 U	2 U	**10**	NT	NT	**12**	NT	NT	2 U
Bis(2-Chloroethoxy) Methane	5	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	1	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
Bis(2-Chloroisopropyl) Ether	5	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
Bis(2-Ethylhexyl) Phthalate	5	3 U	3 U	3 U	3 U	NT	NT	3 U	NT	NT	3 U
Carbazole	NS	2 U	2 U	2 U	52	NT	NT	62	NT	NT	2 U
Chrysene	**0.002**	**0.12**	**0.08 J**	**0.02 J**	NR	NT	**2.1**	NR	NT	**1.5**	0.1 U
Dibenz(a,h)Anthracene	NS	0.1 U	0.1 U	0.02 J	NR	NT	0.31 J	NR	NT	0.15 J	0.1 U
Dibenzofuran	NS	2 U	2 U	2 U	27	NT	NT	31	NT	NT	2 U
Diethyl Phthalate	50	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
Dimethyl Phthalate	50	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
Di-N-Butyl Phthalate	50	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
Di-N-Octylphthalate	50	5 U	5 U	5 U	5 UJ	NT	NT	5 UJ	NT	NT	5 U
Fluoranthene	50	0.92	0.17	0.07 J	NR	NT	4.2	NR	NT	3.1	0.1 U
Fluorene	50	0.11	0.04 J	1.9	NR	NT	1 UJ	NR	NT	13	0.1 U
Hexachlorobenzene	0.04	0.8 U	0.8 U	0.8 U	NR	NT	8 U	NR	NT	8 U	0.8 U
Hexachlorobutadiene	0.5	0.5 U	0.5 U	0.5 U	NR	NT	5 U	NR	NT	5 U	0.5 U
Hexachlorocyclopentadiene	5	20 U	20 U	20 U	20 U	NT	NT	20 U	NT	NT	20 U
Hexachloroethane	5	0.8 U	0.8 U	0.8 U	NR	NT	8 U	NR	NT	8 U	0.8 U
Indeno(1,2,3-c,d)Pyrene	**0.002**	**0.04 J**	0.1 U	**0.02 J**	NR	NT	**1.5**	NR	NT	**0.69 J**	0.1 U
Isophorone	50	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
Naphthalene	10	0.21	0.1 U	0.43	NR	NT	1 R	NR	NT	1.7 R	0.1 U
Nitrobenzene	0.4	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
N-Nitrosodi-N-Propylamine	NS	5 U	5 U	5 U	5 U	NT	NT	5 U	NT	NT	5 U
N-Nitrosodiphenylamine	50	2 U	2 U	2 U	2 U	NT	NT	2 U	NT	NT	2 U
Pentachlorophenol	NS	0.8 U	0.8 U	0.8 UJ	NR	NT	8 UJ	NR	NT	8 UJ	0.8 U
Phenanthrene	50	0.1 U	0.1 U	0.71	NR	NT	2.1 J	NR	NT	12 J	0.03 J
Phenol	**1**	**2.8 J**	5 U	5 U	NR	**280 D**	NT	NR	**340 D**	NT	5 U
Pyrene	50	1.4	0.32	0.12	NR	NT	3.6	NR	NT	6.2	0.1 U

Table 2C
Site Management Plan
Polychrome East (BCP No. C360098)
Baseline Groundwater Sample Analytical Results
Metals (Dissolved)

	AKRF Sample ID	PCE-MW-A-20191011	PCE-MW-B-20191011	PCE-MW-C-20191015	PCE-MW-D-20191015	PCE-MW-X-20191015	Field Blank-20191011
	Laboratory Sample ID	L1947800-03	L1947800-02	L1948207-01	L1948207-02	L1948207-03	L1947800-01
	Date Sampled	10/11/2019 1:00:00 PM	10/11/2019 11:25:00 AM	10/15/2019 11:38:00 AM	10/15/2019 1:12:00 PM	10/15/2019	10/11/2019 10:15:00 AM
	Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	Dilution Factor	1	1	1	1	1	1
Compound	**AWQSGV**	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q	CONC Q
Aluminum	NS	1,450	4.28 J	10 U	149	143	10 U
Antimony	3	4 U	4 U	4 UJ	1.55 J	1.14 J	4 U
Arsenic	25	17.31	2.88	2.97	15.15	14.67	0.5 U
Barium	1,000	31.12	67.8	57.99	67.41	69.56	7.42
Beryllium	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	5	0.09 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Calcium	NS	56,500	75,500	74,800	47,500	49,300	256
Chromium, Total	50	1.01	1 U	1 U	1.37	1.41	0.46 J
Cobalt	NS	1.05	0.43 J	0.5	0.29 J	0.3 J	0.5 U
Copper	200	7.45	1 U	1 U	17.07	17.35	1 U
Iron	**300**	82.3	128	**1,530**	**613**	**643**	50 U
Lead	25	3.57	1 U	1 U	16.76	17.36	1 U
Magnesium	35,000	33.4 J	13,500	6,540	14,600	14,800	70 U
Manganese	**300**	1.07	292.3	**468.7**	**304.4**	**325.2**	1 U
Mercury	**0.7**	0.2 U	0.2 U	0.2 U	**5.95 JK**	**8.43 JK**	0.2 U
Nickel	100	8.74	2 U	1.75 J	12.01	11.23	2 U
Potassium	NS	28,800	31,900	8,680	75,400	74,000	100 U
Selenium	10	9.19	5 U	5 U	5 U	5 U	5 U
Silver	50	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Sodium	**20,000**	**272,000**	**158,000**	**24,600**	**132,000**	**131,000**	1,960
Thallium	0.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vanadium	NS	26.85	5 U	5 U	5 U	5 U	5 U
Zinc	2,000	10 U	10 U	19.92	10.77	9.83 J	10 U

Table 2D
Site Management Plan
Polychrome East (BCP No. C360098)
Baseline Groundwater Sample Analytical Results
Metals (Total)

	AKRF Sample ID	PCE-MW-A-20191011	PCE-MW-B-20191011	PCE-MW-C-20191015	PCE-MW-D-20191015
	Laboratory Sample ID	L1947800-03	L1947800-02	L1948207-01	L1948207-02
	Date Sampled	10/11/2019 1:00:00 PM	10/11/2019 11:25:00 AM	10/15/2019 11:38:00 AM	10/15/2019 1:12:00 PM
	Unit	µg/L	µg/L	µg/L	µg/L
	Dilution Factor	1	1	1	1
Compound	**AWQSGV**	CONC Q	CONC Q	CONC Q	CONC Q
Aluminum	NS	2,170	69.8	87.5	376
Antimony	**3**	2.29 J	4 U	0.45 J	**7.2 J**
Arsenic	25	15.22	3.13	4.61	16.04
Barium	1,000	29.81	80.22	59.84	71.53
Beryllium	3	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	5	0.19 J	0.2 U	0.2 U	0.07 J
Calcium	NS	61,600	70,200	72,400	45,900
Chromium, Total	50	4.07	0.6 J	1 U	2.03
Cobalt	NS	1.43	0.62	0.54	0.32 J
Copper	200	22.25	1 U	2.64	42.3
Iron	**300**	**1,050**	**2,220**	**3,190**	**1,120 JK**
Lead	**25**	17.17	1.45	3.21	**38.2**
Magnesium	35,000	255	13,600	6,260	13,800
Manganese	**300**	17.52	297.2	**471**	**338.9**
Mercury	**0.7**	0.2 U	0.2 U	0.2 U	NR
Nickel	100	10.4	0.65 J	1.97 J	12.46
Potassium	NS	33,800	31,000	8,600	73,500
Selenium	10	9.95	5 U	5 U	5 UJ
Silver	50	0.4 U	0.4 U	0.4 U	0.4 U
Sodium	**20,000**	**269,000**	**154,000**	**23,500**	**124,000**
Thallium	0.5	1 U	1 U	0.5 U	0.5 U
Vanadium	NS	40.35	5 U	5 U	1.62 J
Zinc	2,000	26.95	3.59 J	25.44	43.08

Table 2D
Site Management Plan
Polychrome East (BCP No. C360098)
Baseline Groundwater Sample Analytical Results
Metals (Total)

	AKRF Sample ID	PCE-MW-D-20191015	PCE-MW-X-20191015	Field Blank-20191011
	Laboratory Sample ID	L1948207-02	L1948207-03	L1947800-01
	Date Sampled	10/15/2019 1:12:00 PM	10/15/2019	10/11/2019 10:15:00 AM
	Unit	µg/L	µg/L	µg/L
	Dilution Factor	2	1	1
Compound	**AWQSGV**	CONC Q	CONC Q	CONC Q
Aluminum	NS	NT	363	10 U
Antimony	**3**	NT	1.12 J	4 U
Arsenic	25	NT	15.72	0.5 U
Barium	1,000	NT	75.46	2.13
Beryllium	3	NT	0.5 U	0.5 U
Cadmium	5	NT	0.06 J	0.2 U
Calcium	NS	NT	49,700	100 U
Chromium, Total	50	NT	2.16	0.41 J
Cobalt	NS	NT	0.34 J	0.5 U
Copper	200	NT	42.23	1.28
Iron	**300**	NT	**1,250 JK**	50 U
Lead	**25**	NT	**38.12**	1 U
Magnesium	35,000	NT	15,200	70 U
Manganese	**300**	NT	**364.3**	1 U
Mercury	**0.7**	**15.48 JK**	**15.8 JK**	0.2 U
Nickel	100	NT	12.45	2 U
Potassium	NS	NT	76,500	100 U
Selenium	10	NT	5 UJ	5 U
Silver	50	NT	0.4 U	0.4 U
Sodium	**20,000**	NT	**132,000**	164
Thallium	0.5	NT	0.5 U	1 U
Vanadium	NS	NT	1.62 J	5 U
Zinc	2,000	NT	43.76	10 U

Table 2A-2D
Site Management Plan
Polychrome East (BCP No. C360098)
Baseline Groundwater Sample Analytical Results
Notes

DEFINITIONS

D :	Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
J :	The reported value is estimated
K :	Reported concentration value is proportional to dilution factor and may be exagerated.
ND :	The standard is a non-detectable concentration by the approved analytical method.
NR :	Not reported.
NS :	No standard.
NT :	Not tested.
R :	Indicates the reported result is unusable. (note: the analyte may or may not be present.)
U :	Indicates that the compound was analyzed for, but not detected.
µg/L :	micrograms per Liter
ng/L :	nanograms per Liter

STANDARDS

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

Exceedances of NYSDEC Class GA AWQSGVs are highlighted in bold font.

APPENDICES

APPENDIX A

ENVIRONMENTAL EASEMENT

592523111EAS002T

Westchester County Recording & Endorsement Page

Submitter Information

Name:	Sahana Rao	Phone:	6463787275
Address 1:	560 Lexington Ave	Fax:	
Address 2:	15th Floor	Email:	srao@sprlaw.com
City/State/Zip:	New York NY 10022	Reference for Submitter:	Polychrome East

Document Details

Control Number: **592523111**
Document Type: **Easement (EAS)**
Package ID: 2019090900071001003
Document Page Count: **9**
Total Page Count: **11**

Parties

☐ Additional Parties on Continuation page

	1st PARTY			2nd PARTY	
1:	AVALON YONKERS SUN SITES LLC	- Other	1:	NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERV	- Other
2:			2:		

Property

☑ Additional Properties on Continuation page

Street Address: 80 ALEXANDER STREET
Tax Designation: 2-2608-29
City/Town: YONKERS
Village:

Cross- References

☐ Additional Cross-Refs on Continuation page

1: 2: 3: 4:

Supporting Documents

1: TP-584

Recording Fees

Statutory Recording Fee:	$40.00
Page Fee:	$50.00
Cross-Reference Fee:	$0.00
Mortgage Affidavit Filing Fee:	$0.00
RP-5217 Filing Fee:	$0.00
TP-584 Filing Fee:	$5.00
Total Recording Fees Paid:	**$95.00**

Transfer Taxes

Consideration:	$0.00
Transfer Tax:	$0.00
Mansion Tax:	$0.00
Transfer Tax Number:	3190

Mortgage Taxes

Document Date:
Mortgage Amount:

Basic:	$0.00
Westchester:	$0.00
Additional:	$0.00
MTA:	$0.00
Special:	$0.00
Yonkers:	$0.00
Total Mortgage Tax:	**$0.00**

Dwelling Type: Exempt: ☐
Serial #:

RECORDED IN THE OFFICE OF THE WESTCHESTER COUNTY CLERK

Recorded: 09/26/2019 at 02:47 PM
Control Number: **592523111**
Witness my hand and official seal

WESTCHESTER COUNTY SEAL

Timothy C.Idoni
Westchester County Clerk

Record and Return To

☐ Pick-up at County Clerk's office

Sive Paget & Riesel
560 Lexington Ave
15th Floor
New York, NY 10022
Attn: Sahana Rao

The Office of the Westchester County Clerk: This page is part of the instrument; the County Clerk will rely on the information provided on this page for purposes of indexing this instrument. To the best of submitter's knowledge, the information contained on this Recording and Endorsement Cover Page is consistent with the information contained in the attached document.

592523111EAS002T

Westchester County Recording & Endorsement Page

Document Details

Control Number:	**592523111**	Document Type:	**Easement (EAS)**
Package ID:	2019090900071001003	Document Page Count: 9	Total Page Count: 11

Properties Addendum

94 ALEXANDER STREET	10701	YONKERS	2 2608 35
94 ALEXANDER STREET	10701	YONKERS	2 2608 37

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 15th day of August, 2019, between Owner(s) Avalon Yonkers Sun Sites, LLC, having an office at 1499 Post Road, Fairfield, Connecticut, 06824, (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 80-94 Alexander Street in the City of Yonkers, County of Westchester and State of New York, known and designated on the tax map of the County Clerk of Westchester as tax map parcel numbers: Section 2. Block 2608 Lots 29 and 35.37, being a portion of the property conveyed to Grantor by deed dated January 3, 2018 and recorded in the Westchester County Clerk's Office as Control Number 573383272. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 2.256 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 31, 2019 and last revised June 24, 2019 prepared by Jaroslava Vonder, L.L.S. of Paulus, Sokolowski and Sartor Architecture & Engineering, P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: A3-0587-05/07 as amended April 13, 2016, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Westchester County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled

Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held

by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:	Site Number: C360098 Office of General Counsel NYSDEC 625 Broadway Albany New York 12233-5500
With a copy to:	Site Control Section Division of Environmental Remediation NYSDEC 625 Broadway Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Avalon Yonkers SunSites, LLC:

By: ______________________

Print Name: Christopher Capece

Title: Vice President Date: 8/8/19

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Suffolk)

On the 8th day of August, in the year 20 19, before me, the undersigned, personally appeared Christopher Capece, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Terese Cirone
Notary Public - State of New York

Terése Cirone
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01CI6385970
Qualified in Suffolk County
Commission Expires January 14, 2023

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: ______________________
Michael J. Ryan, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 15th day of August, in the year 2019, before me, the undersigned, personally appeared Michael J. Ryan, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2022

SCHEDULE "A" PROPERTY DESCRIPTION

BEGINNING AT A POINT, SAID POINT BEING THE INTERSECTION FORMED BY THE EASTERLY RIGHT-OF-WAY OF ALEXANDER STREET (50 FOOT RIGHT-OF-WAY) WITH THE SOUTHERLY RIGHT-OF-WAY OF ASHBURTON AVENUE (50 FOOT RIGHT-OF-WAY), AND RUNNING THENCE;

ALONG SAID SOUTHERLY RIGHT-OF-WAY, SOUTH 81°47'39" EAST A DISTANCE OF 263.00 FEET TO A POINT, THENCE, THE FOLLOWING THREE (3) COURSES ALONG THE WESTERLY RIGHT-OF-WAY OF THE NEW YORK CENTRAL RAILROAD COMPANY;

SOUTH 14°03'55" WEST A DISTANCE OF 146.03 FEET TO A POINT, THENCE;

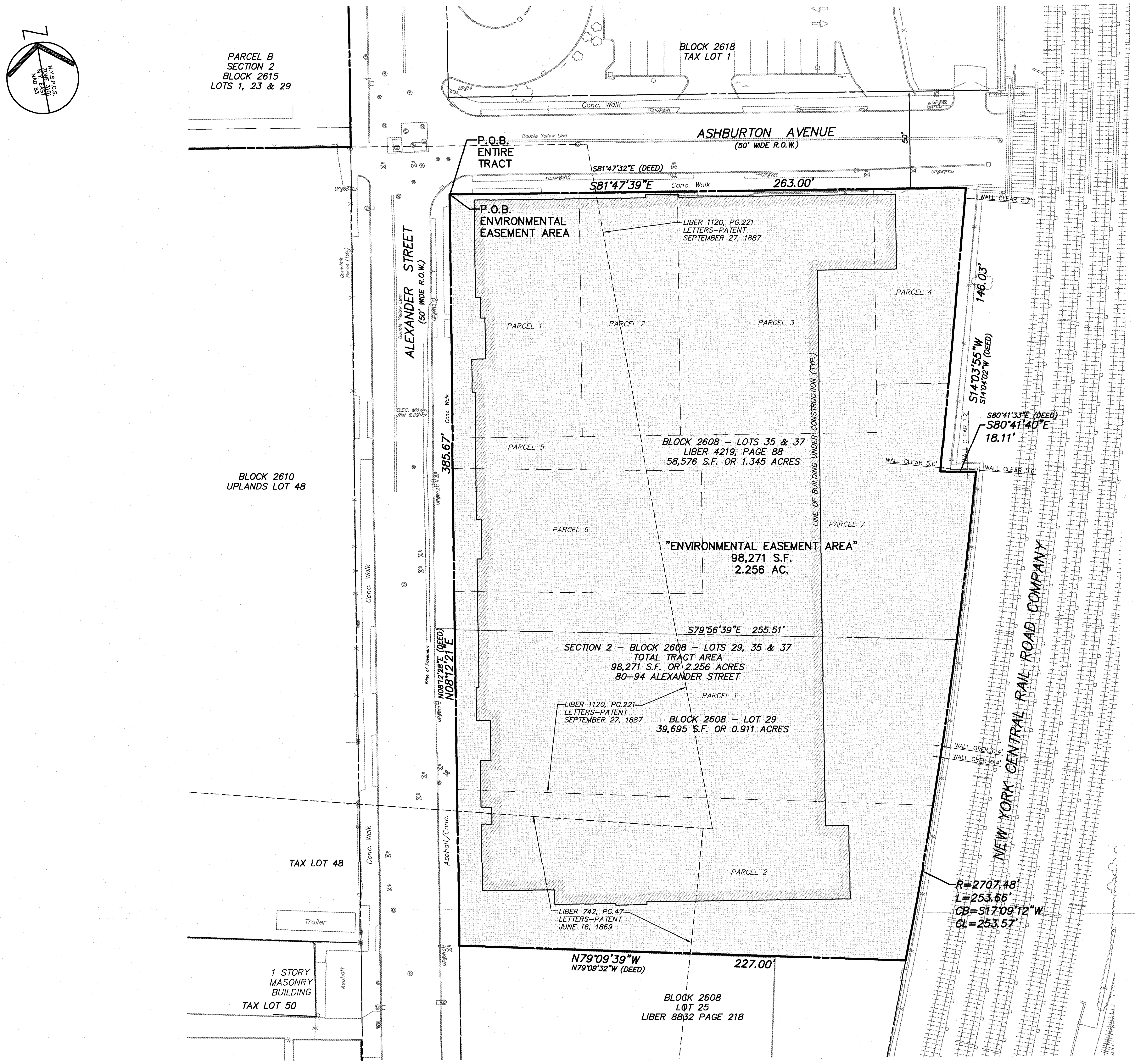
SOUTH 80°41'40" EAST A DISTANCE OF 18.11 FEET TO A POINT OF CUSP;

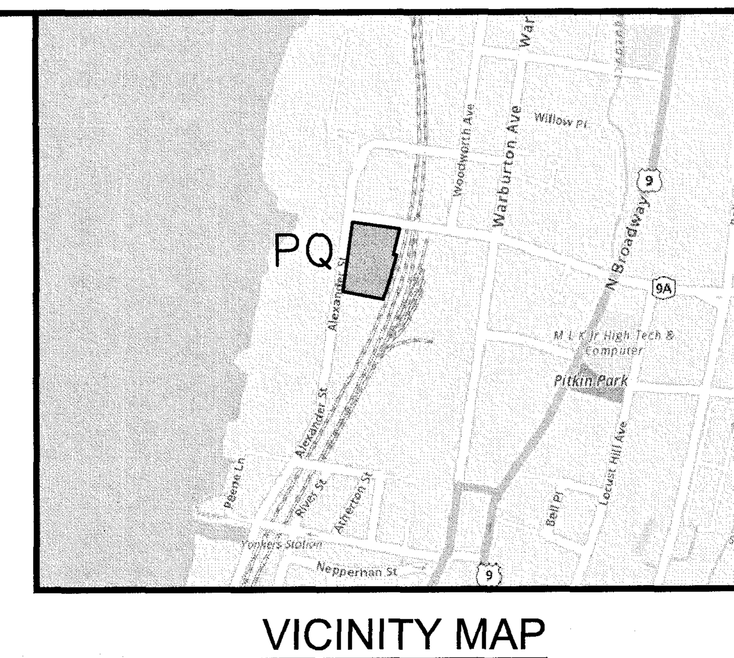
ON A CURVE TO THE RIGHT HAVING A RADIUS OF 2707.48 FEET, AN ARC LENGTH OF 253.66 FEET, WHOSE CHORD BEARS SOUTH 17°09'12" WEST A CHORD DISTANCE OF 253.57 FEET TO A POINT OF TANGENCY, THENCE;

ALONG THE NORTHERLY LINE OF LOT 25, BLOCK 2608, NORTH 79°09'39" WEST A DISTANCE OF 227.00 FEET TO A POINT IN THE EASTERLY RIGHT-OF-WAY OF ALEXANDER STREET, THENCE;

ALONG SAID EASTERLY, RIGHT-OF-WAY, NORTH 08°12'21" EAST A DISTANCE OF 385.67 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 98,271 SQUARE FEET OR 2.256 ACRES MORE OR LESS.





VICINITY MAP

(NOT TO SCALE)

REV. / ISSUE	DATE	DESCRIPTION
1	6/24/19	PER D.E.C. COMMENTS

LEGEND

- EXISTING TREE
- CHAIN LINK FENCE
- STORM INLET
- SIGN
- UTILITY POLE
- FIRE HYDRANT
- LIGHT
- TC TOP OF CURB
- DC DEPRESSED CURB
- BC BOTTOM OF CURB
- FLOOD LIGHT
- BOLLARD POST
- SPRINKLER
- —OHW— OVERHEAD WIRES
- SANITARY MANHOLE
- TELEPHONE MANHOLE
- WATER MANHOLE
- PROPERTY LINE
- CURB
- WALL
- CONCRETE MONUMENT (FOUND)

REFERENCES

1. WESTCHESTER COUNTY TAX ASSESSMENT MAP SHEETS; 3 & 32.
2. DEED FOR BLOCK 2608, LOT 29, PARCEL 1 IN LIBER 7102, CP.503.
3. DEED FOR BLOCK 2608, LOT 29, PARCEL 2 IN LIBER 7167, CP.105.
4. DEED FOR BLOCK 2608, LOTS 35 & 37 IN LIBER 4219, CP.88.
5. DEED FOR BLOCK 2608, LOTS 29, 35 & 37 AS CONTROL NUMBER 521883302.
6. DEED FOR BLOCK 2615, LOT 23 IN LIBER 6785, CP.137.
7. DEED FOR BLOCK 2615, LOTS 1 & 29 IN LIBER 6438, CP.75.
8. DEED FOR BLOCK 2615, LOT 29 IN LIBER 6902, CP.146.
9. DEED FOR BLOCK 2615, LOTS 1, 23 & 29 AS CONTROL NUMBER 540413079.
10. "MAP OF PIER AND BULKHEAD LINES, SHOWING THE LINES IN THE HUDSON RIVER FIXED AND LOCATED BY THE COMMON COUNCIL OF THE CITY OF YONKERS ON THE TWELFTH DAY OF APRIL 1886 BEYOND WHICH NO PIERS OR BULKHEADS SHALL EXTEND ~ ALSO SHOWING THE LINES OF GRANTS OF LAND UNDER WATER AS GRANTED BY LAND COMMISSIONERS OF THE STATE OF NEW YORK AND DOCKS AND PIERS AS ACTUALLY CONSTRUCTED."
11. "RIGHT OF WAY MAP, NEW YORK CENTRAL RAILROAD, OPERATED BY NEW YORK CENTRAL RAILROAD COMPANY, MAIN LINE, ELECTRIC DIVISION, YONKERS, FROM STA. 79+200 TO STA. 84+480, 1 IN.=100FT., JUNE 30TH 1917" BEARING MAP NUMBER V64916 AND V59/L10.
12. MAP ENTITLED "ALTA/NSPS LAND TITLE SURVEY, PARCEL A, BLOCK 2608, LOTS 29, 35 & 37, CITY OF YONKERS, WESTCHESTER COUNTY, N.Y." PREPARED BY PAULUS, SOKOLOWSKI AND SARTOR ARCHITECTURE & ENGINEERING, P.C. DATED DECEMBER 12, 2017.
13. DEED RECORDED IN THE OFFICE OF THE WESTCHESTER COUNTY CLERK ON JANUARY 22, 2018 AS CONTROL NUMBER 573383272. SCHEDULE A IS POLYCHROME EAST SITE, SCHEDULE B IS POLYCHROME WEST SITE.

SURVEY NOTES

1. THIS SURVEY IS VALID ONLY WHEN SURVEYOR'S EMBOSSED SEAL IS AFFIXED
2. BOUNDARY & FIELD LOCATED TOPOGRAPHIC INFORMATION SHOWN HEREON WAS PREPARED BY PAULUS, SOKOLOWSKI & SARTOR, LLC DURING JULY 2015.
3. AERIAL MAPPING WAS PREPARED BY ATLANTIS AERIAL SURVEY CO. (PROJECT #1603-0410) AND IS BASED ON PHOTOGRAPHY DATED 4-29-2004, AND REVISED NOVEMBER 2006.
4. HORIZONTAL POSITIONS WERE ESTABLISHED USING GPS SURVEY TECHNIQUES. HORIZONTAL POSITIONS ARE BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM (NAD 83 EAST ZONE) USING NATIONAL GEODETIC SURVEY(NGS) MONUMENT K40 (PID KU1618) AS THE SOURCE OF HORIZONTAL CONTROL.
5. VERTICAL POSITIONS WERE ESTABLISHED BY ATLANTIS AERIAL SURVEY CO. AND ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD 29). USE SITE BENCHMARKS FOR VERTICAL CONTROL.
6. MEAN HIGH WATER LINE ESTABLISHED BY USING TIDAL BENCH MARK "ALPINE", HUDSON RIVER, NEW JERSEY, (STATION ID 8530095). PUBLISHED MHW 1.85' (NAVD 88) CALCULATED 2.87' (NGVD 29).

GRAPHIC SCALE

30 0 15 30 60 120

0 9.14 4.57 9.14 18.28 36.56

(IN FEET)
1 inch = 30 ft.

(IN METERS)
1 inch = 9.14 meters

PAULUS, SOKOLOWSKI AND SARTOR ARCHITECTURE & ENGINEERING, P.C.
67B MOUNTAIN BLVD EXT.
P.O. BOX 4039
WARREN, NJ 07059
PHONE: (732) 560-9700

JAROSLAVA VONDER
N.Y. LIC. NO. 050533

SIGNATURE DATE
PROFESSIONAL LAND SURVEYOR

SCHEDULE A DESCRIPTION – POLYCHROME EAST SITE

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND SITUATE, LYING AND BEING IN THE CITY OF YONKERS, COUNTY OF WESTCHESTER AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE CORNER FORMED BY THE INTERSECTION OF THE EASTERLY SIDE OF ALEXANDER STREET WITH THE SOUTHERLY SIDE ASHBURTON AVENUE;

RUNNING THENCE SOUTH 81°47'32" EAST ALONG THE SOUTHERLY SIDE OF ASHBURTON AVENUE 263.00 FEET;

THENCE SOUTH 14°04'02" WEST 146.03;

THENCE SOUTH 80°41'33" EAST 18.11 FEET;

THENCE ALONG AN ARC OF A CURVE BEARING TO THE RIGHT HAVING A RADIUS OF 2707.48 FEET A DISTANCE OF 253.66 FEET;

5. THENCE NORTH 79°09'32" WEST 227.00 FEET TO THE EASTERLY SIDE ALEXANDER AVENUE;

6. THENCE ALONG THE EASTERLY SIDE OF ALEXANDER AVENUE NORTH 08°12'28" EAST 385.67 FEET TO THE POINT OR PLACE OF BEGINNING.

SCHEDULE B DESCRIPTION – POLYCHROME WEST SITE

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND SITUATE, LYING AND BEING IN THE CITY OF YONKERS, COUNTY OF WESTCHESTER AND STATE OF NEW YORK:

BEGINNING AT THE CORNER FORMED BY THE INTERSECTION OF THE WESTERLY SIDE OF ALEXANDER STREET AND THE NORHERLY SIDE OF ASHBURTON AVENUE OF ASHBURTON AVENUE; AND

RUNNING THENCE NORTH 81°29'30" WEST 661.20 FEET TO THE WESTERLY LINE OF GRANTS AND PIER LINE AS ESTABLISHED BY THE COMMON COUNCIL OF THE CITY OF YONKERS AS OF APRIL 12, 1886;

THENCE ALONG SAID LINE NORTH 09°50'30" EAST 302.06 FEET;

THENCE SOUTH 81°29'30" EAST 654.17 FEET TO THE WESTERLY SIDE OF ALEXANDER STREET;

THENCE ALONG THE WESTERLY SIDE OF ALEXANDER STREET
SOUTH 08°30'30" WEST 301.98 FEET TO THE POINT OR PLACE OF BEGINNING.

ENVIRONMENTAL EASEMENT AREA DESCRIPTION

BEGINNING AT A POINT, SAID POINT BEING THE INTERSECTION FORMED BY THE EASTERLY RIGHT-OF-WAY OF ALEXANDER STREET (50 FOOT RIGHT-OF-WAY) WITH THE SOUTHERLY RIGHT-OF-WAY OF ASHBURTON AVENUE (50 FOOT RIGHT-OF-WAY), AND RUNNING THENCE;

1. ALONG SAID SOUTHERLY RIGHT-OF-WAY, SOUTH 81°47'39" EAST A DISTANCE OF 263.00 FEET TO A POINT, THENCE, THE FOLLOWING THREE (3) COURSES ALONG THE WESTERLY RIGHT-OF-WAY OF THE NEW YORK CENTRAL RAILROAD COMPANY;

2. SOUTH 14°03'55" WEST A DISTANCE OF 146.03 FEET TO A POINT, THENCE;

3. SOUTH 80°41'40" EAST A DISTANCE OF 18.11 FEET TO A POINT OF CUSP;

4. ON A CURVE TO THE RIGHT HAVING A RADIUS OF 2707.48 FEET, AN ARC LENGTH OF 253.66 FEET, WHOSE CHORD BEARS SOUTH 17°09'12" WEST A CHORD DISTANCE OF 253.57 FEET TO A POINT OF TANGENCY, THENCE;

5. ALONG THE NORTHERLY LINE OF LOT 25, BLOCK 2608, NORTH 79°09'39" WEST A DISTANCE OF 227.00 FEET TO A POINT IN THE EASTERLY RIGHT-OF-WAY OF ALEXANDER STREET, THENCE;

6. ALONG SAID EASTERLY, RIGHT-OF-WAY, NORTH 08°12'21" EAST A DISTANCE OF 385.67 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 98,271 SQUARE FEET OR 2.256 ACRES MORE OR LESS.

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for the Easement are set forth in more detail in the Site Management Plan ("SMP"). A copy of the SMP must be obtained by any party with an interest to the property. the SMP may be obtained from the NYS Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov.

POLYCHROME MANUFACTURING SITE (POLYCHROME EAST SITE) BPC SITE NUMBER C360098

PROJECT

POLYCHROME EAST SITE
SECTION 2, BLOCK 2608
LOTS 29, 35 & 37
80-94 ALEXANDER STREET
CITY OF YONKERS
WESTCHESTER COUNTY, N.Y.

SHEET TITLE

ENVIRONMENTAL EASEMENT AREA

PROJECT NO.: 03102-0011	DRAWN BY: BJF
SCALE: 1"=30'	CHECKED BY: JV
DATE: 5/31/19	SHEET 1 OF 1
SHEET NO.	S-1

APPLICATION TO AMEND THE OFFICIAL ROLL AND TAX MAP OF THE CITY OF YONKERS, NEW YORK

FILE INFORMATION

Number	Date
1902	5/31/2019

SUBJECT PROPERTIES As or Representing the Owner(s) of the Properties Listed Below

Block:	Lot:	Block:	Lot:	Block:	Lot:	Block:	Lot:
2608	29						
2608	35.37						

AMENDMENT INFORMATION A Request is Being Made to Amend the Official Roll and Tax Map to Read:

Block	Lot	PROPERTY ADDRESS		ZONE	USE	SQ. FT.	OWNER BILLING INFORMATION
2608	35	80	ALEXANDER STREET X - 657751 Y - 767943	I	VACANT COMM	98,271	AVALON YONKERS SUN SITES LLC 1499 POST ROAD FAIRFIED CT 06824 A2000155

Amendment Type | **Comments:**

Notes: RECEIVED BY JUN 12 2019 DEPARTMENT OF HOUSING & BUILDINGS YONKERS, N.Y.

LOTS BEFORE AMENDING: 2

LOTS AFTER AMENDING: 1

FEE: $250.00

Page 1 of 1

The fee for application processing will be $250.00 for the first two lots remaining after amendment, and an addition $200.00 for each lot over two remaining after amendment. Check or money order made payable to the City of Yonkers. FOUR (4) copies of a survey, sealed by a licensed surveyor, of each proposed lot indicating square footage, dimensions, and distances from existing buildings to new lot line(s) must be submitted along with FOUR (4) sealed surveys of the property before its amendment.

This application will not become effective unless it is in full compliance with Section 932 of the Real Property Tax Law and Regulations regarding the Subdivision of Real Properties in the State of New York and the City of Yonkers. By signing this application, the owner(s) agree to pay the City and County taxes on the original lots until the Tax/Assessment roll reflects the above noted changes.

APPLICANT INFORMATION

Initiated by REPRESENTATIVE OF OWNER

Applicant Name x Janet Giris

Applicant Phone Number 914 684 0200

Janet Giris
Applicant's Signature

Applicant's Signature

Owner's Phone Number

Owner's Signature

Owner's Signature

Owner's Signature

x 5/31/19
Date

FINANCE (TAX) APPROVAL

Approved ☒ *Date* 5.31.19

Effective Tax Year 20/21

Comments: subject to payment of City 19/20 tax Bill & County 20 tax Bill

Finance Signature

ASSESSMENT APPROVAL

Related Liber+Page *Recording Date*

Map Changed ☐ *Cards Updated* ☐

Key Entered ☐ *Completion Date*

RPS updated LB 9/10/19
Assessment Signature

HOUSING & BUILDING APPROVAL

Approved ☒ *Date* 09/04/19

Denied ☐

Engineer's Signature

Commissioner's Signature

Comments: Approved for lot combination 09/19

REVIEWED BY SEP - 6 2019 DEPARTMENT OF HOUSING & BUILDINGS YONKERS, N.Y.

Appendix B

List of Site Contacts

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Avalon Yonkers Sun Sites, LLC	(516) 501-6004 / christopher_reynolds@avalonbay.com
Patrick McHugh (PE/Qualified Environmental Professional)	(914) 922-2387 / pmchugh@akrf.com
Mark A. Chertok (Client Attorney)	(212) 421-2150 / mchertok@sprlaw.com
Matthew Hubicki NYSDEC Project Manager 625 Broadway Albany, NY 12233-7014	(518) 402-9605 / matthew.hubicki@dec.ny.gov
Sarita Wagh Bureau of Environmental Exposure Investigation New York State Department of Health	(518) 402-7860 / BEEI@health.ny.gov
Chief, Site Control Section New York State Department of Environmental Conservation Division of Environmental Remediation	(518) 402-9543
NYSDEC Region 3 Hazardous Waste Engineer	(845) 256-3000

APPENDIX C

EXCAVATION WORK PLAN

EXCAVATION WORK PLAN (EWP)

1.1 Notification

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the Site Owner or their Qualified Environmental Professional (QEP) representative will notify the New York State Department of Environmental Conservation (NYSDEC). The following NYSDEC contacts will be notified: The contact information below will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B.

Matthew S. Hubicki, Site Project Manager
New York State Department of Environmental Conservaiton
Division of Environmental Remediation
625 Broadway
Albany, NY 12233-7020
Matthew.hubicki@dec.ny.gov
(518) 402-9605

and

NYSDEC Site Control Section
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233-7020

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for Site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly-contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix D of this Site Management Plan (SMP);
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

1.2 Soil Screening Methods

Soil screening is performed in the field to determine if excavated materials may be staged for reuse characterization or will require disposal off-Site. Visual, olfactory and instrument-based (e.g., photoionization detector) soil screening will be performed by a QEP or a person under their supervision during all excavations beneath the Cover System into known or potentially contaminated material (remaining contamination), after issuance of the Certificate of Compliance (COC). This includes, but is not limited to, invasive work performed during or post development such as excavations for new foundations and utility work. Refer to the SMP for additional details on Cover System components and information on underlying remaining contamination.

Excavated Cover System component materials (e.g., soil cover materials above the demarcation layer) should be stockpiled separately for reuse within the Cover System. Appropriate soil staging measures (see Section 1.3) will be used to avoid co-mingling Cover System materials with underlying historic fill materials/remaining contamination. Any Cover System materials that have (or potentially have) co-mingled with underlying fill materials will be screened following the soil screening procedures below.

Fill materials encountered beneath the Cover System will be segregated based on the following criteria.

- **Category 1**: Excavated material that exhibits no field evidence of contamination [e.g., no observable odors, no staining, and photoionization detector (PID) readings less than 5 parts per million (ppm) above background] can be staged on-Site (following appropriate soil staging measures detailed in Section 1.3) for reuse characterization. Material reuse criteria is detailed in Section 1.7.
- **Category 2**: Excavated material that exhibits field evidence of contamination [e.g., observable odors, staining, and/or PID readings greater than 5 ppm above background], may not be reused on-Site and will be staged on-Site (following appropriate soil staging measures detailed in Section 1.3) for characterization and off-Site disposal as detailed in Section 1.6.

  Additional measures detailed in Section 1.12 should be taken if grossly contaminated media (as defined in DER-10) is encountered. Further discussion of off-Site disposal is provided in Section 1.7.

1.3 Soil Staging Methods

Stockpiled materials must be constructed and maintained consistent with the Site's Stormwater Pollution Prevention Plan (SWPPP), and any other state/local permits or regulations. The SWPPP is further detailed in Section 1.11. Below are details describing stockpiling methods for excavated materials (prior to reuse or off-Site disposal) or for imported materials staged for future use:

1. Stockpiled soil shall be staged at a location and elevation such that it would not be subject to periodic tidal flooding events. In the event of a major storm event forecast that may result in an extreme flooding event, contingency measures (e.g., additional hay bales or additional erosion control, movement of pile, etc.) will be implemented to manage any stockpiled soils.
2. Excavated materials must be segregated into separate stockpiles as detailed in Section 1.2. The Contractor will coordinate with the QEP to maintain compliance with material segregation.
3. Stockpiles will be kept covered at all times with appropriately anchored tarps. Additional odor controls should be used in the event covering the tarp does not mitigate odors.

4. Bermed plastic sheeting will be used under and around stockpiles as necessary to avoid historic fill materials from contacting soil cover materials. As an alternative, historic fill materials can be placed on hardscape surfaces (e.g., asphalt pavement) with the exception of grossly contaminated media, which must be handled as detailed in Section 1.12.
5. Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.
6. Stockpiles will be inspected at a minimum once each week and after every storm event. Damaged tarp covers will be promptly replaced. Results of stockpile inspections will be recorded in a logbook or as part of the SWPPP inspection reports and maintained at the Site and available for inspection by the NYSDEC.

Alternative procedures to stockpiling could include, but are not limited to, agreement(s) from the intended disposal or treatment facilities to accept analytical data previously obtained so that materials may be directly loaded onto trucks for shipment to the disposal facility.

1.4 Materials Excavation and Load-Out

A QEP or person under their supervision will oversee all invasive work beneath the Cover System and into underlying fill materials/remaining contamination, including load-out of all excavated material. The Owner and the Contractor are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site will be investigated by the QEP. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the Site.

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).

The Contractor will be responsible for ensuring that all outbound trucks are clean of dirt and other materials before leaving the Site until the activities performed under this section are complete. A designated truck wash area will be operated on-Site, as appropriate, by the Contractor. Truck wash waters will be collected and handled in an appropriate manner.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site soil tracking. The Contractor will be responsible for cleaning Site entrances and/or adjacent streets as needed to maintain a clean condition with respect to Site-derived materials.

1.5 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.

Trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Trucks should enter and exit the Site using Ashburton Avenue. Ashburton Avenue can be used to access Route 9. All trucks loaded with Site materials will exit the vicinity of the Site using only approved truck routes, which may be altered as redevelopment of the surrounding area continues.

This is the most appropriate route and takes 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 the neighborhood outside the project Site. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during any work subject to this EWP. Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

1.6 Materials Disposal Off-Site

Absent to analytical results to the contrary or as otherwise detailed in Sections 1.2 and 1.3, all material excavated and removed from the Site will be treated as contaminated and regulated material and will be transported off-Site and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations.

The pre-excavation notification to NYSDEC (as detailed in Section 1.1) must include pre-selected disposal facilities for potential waste streams. This notification should also include estimated quantities and a breakdown by class of disposal facility if appropriate (i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc).

Actual disposal quantities and associated disposal documentation (i.e., test results, waste profiles, facility acceptance letters, manifests, bills of lading and facility receipts) will be reported to the NYSDEC in the Periodic Review Report.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility). Material may be proposed for re-use.

If disposal of material from this Site is proposed for unregulated off-Site disposal (e.g., clean soil removed for development purposes or utility repairs), a formal request with an associated plan, characterization analytical results, etc. will be submitted to the NYSDEC. Unregulated off-Site management of materials from this Site will not occur without formal NYSDEC approval.

If hazardous waste is encountered, the materials will be stored, transported, and disposed of in compliance with applicable local, state, and federal regulations and under hazardous waste manifesting procedures.

1.7 Materials Reuse On-Site

Materials originating in the Site Cover System (i.e., soil cover materials above the demarcation layer) will not require additional sampling for reuse compliance. These materials should be stockpiled separately and can be reused within the Cover System in a similar manner to its use prior to excavation; beneath the Cover System; or characterized for off-Site reuse or disposal. Any demarcation fabric removed should also be restored as further discussed in Section 1.9.

Fill materials originating on-Site beneath the Cover System, which meet Category 1 Criteria (defined in Section 1.3), may be reused on-Site or exported for reuse provided sampling demonstrates compliance with criteria as detailed in the table below. The table below is derived from DER-10 Table 5.4(e)4. Fill materials which are not proposed for reuse will be disposed off-Site in accordance with Section 1.6.

Table 1.7 – Reuse of Soil Criteria

Soil On Site Meets:	On-Site Reuse	Off-Site Reuse
Unrestricted Use listed in DER-10 Appendix 5	Without Restrictions	Without Restrictions
Restricted Residential Use listed in DER-10 Appendix 5	In the Cover System or as backfill within the area of the Site subject to the IC.	Not Allowed, unless going to a Site with IC subject to a 6 NYCRR Part 360 Beneficial Use Determination (BUD).
Site-Specific Reuse Criteria (detailed below the Table) for Below the Cover System	Below the Cover System at an elevation of at least 5 feet above the mean high water table;	Not Allowed, unless additional sampling confirms acceptability at a Site with IC subject to a 6 NYCRR Part 360 BUD.

Site-Specific Reuse Criteria (Below Cover System): Fill materials intended for on-Site reuse below the Cover System should be sampled for total chromium, total lead and total mercury at a minimum frequency of one composite sample for every 1,000 cubic yards. The analytical results must confirm that the soil meets the Site Specific Reuse Criteria outlined below.

- Total Arsenic <= 16 mg/kg
- Total Chromium <= 1,500 mg/kg
- Total Copper <= 270 mg/kg
- Total Lead <= 1,000 mg/kg
- Total Mercury <= 2.8 mg/kg
- Total SVOCs <= 500 mg/kg

Fill material sampling should be conducted by or under the supervision of a QEP in accordance with the Field Activities Plan (Appendix I of the SMP).

If characterization results meet the Site-specific criteria outlined above, soil can be reused on-Site below the Cover System at an elevation of at least 5 feet above the mean high water table; otherwise, the materials will be characterized for off-Site disposal in accordance with Section 1.6.

Any demolition material proposed for reuse on-Site (which is not subject to a case specific or pre-determined BUD) will be reviewed with NYSDEC to develop an appropriate reuse plan. Concrete crushing or processing on-Site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site will not be reused on-Site.

1.8 Fluids Management

All liquids to be removed from the Site, including but not limited to, excavation dewatering, decontamination water and groundwater monitoring well purge and development water, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site, and will be managed off-Site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (e.g., a local pond, stream or river) will be performed in accordance with an applicable local, state, and/or Federal permit.

1.9 Cover System Restoration

After the completion of soil removal and any other invasive activities, the Cover System will be restored in a manner that complies with the Decision Document and the RAWP. A QEP will document that the Cover System component, including the demarcation layer, was restored appropriately.

The Existing Cover System is composed of several components which are further detailed Section 3.3.1 and shown on Figure 6A of the SMP. Additional Cover System components will be installed as redevelopment of the Site continues (referred to as the Future Cover System). This Future Cover System (also detailed in Section 3.3.1 of the SMP) is shown on Figure 6B. Each Cover System component is underlain by a demarcation layer (e.g., orange snow fence) which acts as a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP.

If a Cover System component changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification to the Cover System element of the remedy. A figure showing the modified Cover System will be included in the subsequent Periodic Review Report and in an updated SMP. Section 3.3.1 of the SMP will also be updated, as necessary. Any modifications to the Cover System must maintain compliance with the Decision Document and the RAWP.

Modifications to the Existing Cover System associated with the installation of the Future Cover System are documented within this SMP and will not require preparation of additional figures or modifications to Section 3.3.1 of the SMP.

1.10 Backfill from Off-Site Sources

Prior to import of materials to the Site, proposed fill materials will be evaluated for compliance with the criteria detailed in this Section and the provisions of this SMP. The following materials may be imported to the Site for use within the Cover System or as backfill beneath the Cover System:

- Fill materials meeting Restricted Residential Use criteria as outlined in DER-10, Appendix 5. The fill materials should be sampled in accordance with frequencies established in DER-10 Table 5.4(e)10 and analyzed for the parameters listed in DER-10, Appendix 5. The fill material analytical results will be reviewed by the Site's QEP for compliance with Restricted Residential Use criteria outlined in DER-10, Appendix 5; or

- Materials other than soil, meeting criteria detailed in DER-10 Section 5.4(e)5 may be imported without chemical testing. Supporting documentation will be reviewed by the Site's QEP for compliance with DER-10 Section 5.4 (e) 5 criteria.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). Fill material sampling should be conducted by or under the supervision of a QEP in accordance with the Field Activities Plan (Appendix I of the SMP).

If the proposed fill materials are in compliance with the criteria detailed above, a NYSDEC Request to Import/Reuse Fill or Soil form (http://www.dec.ny.gov/regulations/67386.html), or similar import request package, will be prepared and submitted to the NYSDEC project manager for review. NYSDEC approval must be received for any fill material prior to importing, unless otherwise approved by the NYSDEC project manager.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites, will not be imported to the Site. In addition, solid wastes will not be imported to the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be directly unloaded for use as backfill or staged in compliance with Section 1.3 of this EWP. Imported fill materials should be stockpiled separately from excavated materials and covered to prevent dust releases.

Manifests/bills of lading will be included in the Periodic Review Report for materials imported during the reporting period.

1.11 Stormwater Pollution Prevention

For construction projects in New York that disturb one or more acre are required to implement a Stormwater Pollution Prevention Plan (SWPPP) approved as part of a State Pollutant Discharge Elimination System (SPDES) Permit for Stormwater Discharges. A SWPPP that conforms to the requirements of the NYSDEC Division of Water guidelines and NYS regulations was prepared for the redevelopment phase of the Site. In summary, the following erosion and sediment control measures must be implemented as required by the SWPPP.

- 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 the 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 SMP 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 construction area.

The SWPPP should be consulted for a complete list of erosion and sediment control measures and inspection/reporting requirements. Following redevelopment, it is not anticipated that a SWPPP will be required by NYS; however, appropriate erosion and sediment control measures will still be implemented during future Site disturbances.

1.12 Excavation Contingency Plan

If underground storage tanks (USTs) or other previously unidentified free product, non-aqueous phase liquid (NAPL), and/or gross contamination as defined in DER-10 are found during post-remedial (or post-development) subsurface excavations, excavation activities will be suspended until sufficient resources are mobilized to address the condition.

Encountered USTs will be removed and disposed of off-Site in accordance with all applicable regulations.

Encountered grossly contaminated media (as defined in DER-10) removed from the excavation area will be segregated from all other excavated materials. Stockpiles will be lined and covered with bermed polyethylene (poly) sheeting. Sampling will be performed on grossly contaminated media removed from the excavation as necessary to determine the nature of the material and proper disposal method. Analysis will be performed for the parameters required by the intended disposal facility. Refer to Section 1.6 for additional information on off-Site disposal procedures.

Grossly contaminated media identified by screening during invasive Site work will be promptly communicated by phone to the NYSDEC Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline, if deemed appropriate by the NYSDEC Project Manager. These findings will be also included in the Periodic Review Report.

1.13 Community Air Monitoring Plan

Community air monitoring will be conducted during all intrusive Site activities that will breach the Cover System and will be performed in compliance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). Real-time monitoring for VOCs and particulate levels at the perimeter of the exclusion zone will be performed as outlined in the CAMP found in Appendix D of the SMP.

1.14 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site and on-Site. Specific odor control methods to be used during excavation of grossly-contaminated soil or areas containing residual NAPL may include:

- Covering vehicles transporting materials on-Site and in accordance with NYSDOT requirements when transporting materials off-Site;
- Odor suppressant foam;
- Maintaining covered stockpiles for odorous material;
- Sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems; and
- Reporting and immediately addressing emissions of nuisance odors with appropriate action/follow-up.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors are identified at the Site boundary, or if odor complaints are received, then the source of odors will be promptly identified and corrective measures implemented. NYSDEC will be notified of odor events. The Contractor will implement appropriate odor controls. Implemented odor control measures will be discussed in the Periodic Review Report.

1.15 Dust Control Plan

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

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles;
- Soil disturbances will be conducted in stages to the extent practicable (and in accordance with the SWPPP) to limit the area of exposed, unvegetated soils vulnerable to dust production;
- 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 truck sprinkling; and
- Cleaning of on-Site and adjacent streets will be performed as needed.

APPENDIX D

HEALTH AND SAFETY PLAN (HASP) & COMMUNITY AIR MONITORING PLAN (CAMP)

POLYCHROME EAST SITE

80-94 ALEXANDER STREET

YONKERS, NEW YORK

Health and Safety Plan and
Community Air Monitoring Plan

NYSDEC BCP Number: C360098

AKRF Project Number: 180132

Prepared for:

Avalon Yonkers Sun Sites, LLC

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JULY 2019

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) were prepared by AKRF, Inc. (AKRF) on behalf of Avalon Yonkers Sun Sites, LLC (the Volunteer) for the Polychrome Manufacturing Site (aka Polychrome East and hereinafter referred to as “the Site”). The Site is approximately 2.3-acres and is located at 80-94 Alexander Street, City of Yonkers, Westchester County, New York. The Site is also identified as Section 2, Block 2608, Lot 1 (consolidated in October 2019 from Lots 29, 35, and 37). The Site is currently in the New York State Brownfield Cleanup Program (BCP) as Site No. C360098, which is administered by New York State Department of Environmental Conservation (NYSDEC).

During 1994 through present the Site has been utilized for light industrial warehousing purpose and bus parking. From 1951 through 1978, the Polychrome Corporation operated at the Site as a manufacturing and warehouse facility for lithographic printing, which included the handling of large volumes of chemicals including solvents, dyes, inks, metals and petroleum products that were associated with Site operations. Prior to occupancy of Polychrome Corporation, Standard Oil reportedly utilized the Site for oil storage. Remediation of the Site was conducted in 2018 to 2019 as part of Site redevelopment.

Based on the endpoint soil sample analytical data collected during the remediation, some contamination remains at the Site. Elevated levels of polycyclic aromatic hydrocarbons (PAHs) and metals remain at the Site. This Health and Safety Plan (HASP) has been designed to provide workplace safety while completing any intrusive work at the Site in the future.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Check all that apply		
(**X**) Organic Chemicals	(**X**) Inorganic Chemicals	( ) Radiological
( ) Biological	( ) Explosive/Flammable	( ) Oxygen Deficient Atm.
(**X**) Heat Stress	(**X**) Cold Stress	( ) Carbon Monoxide
Comments: No personnel are permitted to enter permit confined spaces.		

2.1.2 Physical Characteristics

Check all that apply		
(**X**) Liquid	(**X**) Solid	(**X**) Sludge
(**X**) Vapors	( ) Unknown	( ) Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	**Solids**	**Sludges**	**Solvents**	**Oils**	**Other**
( ) Acids	(**X**) Ash	( ) Paints	( ) Halogens	( ) Transformer	( ) Lab
( ) Caustics	( ) Asbestos	( ) Metals	(**X**) Petroleum	( ) Other DF	( ) Pharm
( ) Pesticides	( ) Tailings	( ) POTW	( ) Other Chlorinated Organic Solvents	(**X**) Motor or Hydraulic Oil	( ) Hospital
(**X**)Petroleum	(**X**) Other	( ) Other		(**X**) Gasoline	( ) Rad
( ) Inks	Fill material			(**X**) Fuel Oil	(X) MGP
( ) PCBs				(**X**) Waste Oil	( ) Mold
(**X**) Metals					( ) Cyanide
(**X**)Other: SVOCs					

2.1.4 Chemicals of Concern

Chemical	REL/PEL/STEL	Health Hazards
Arsenic	REL C: 0.002 mg/m^3 PEL: 0.010 mg/m^3	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen].
Benzene	REL: 0.1 ppm N STEL: 1 ppm PEL: 1 ppm O STEL: 5 ppm	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen].
Chromium	REL: 0.5 mg/m^3 PEL: 1 mg/m^3	Irritation eyes, skin; lung fibrosis (histologic).
Ethylbenzene	REL: 100 ppm N STEL: 125 ppm PEL: 100 ppm	Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects.
Fuel Oils	REL: 100 mg/m^3	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid).
Lead	REL: 0.050 mg/m^3 PEL:0.050 mg/m^3	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.
Mercury	REL: 0.05 mg/m^3 REL C: 0.1 mg/m^3 PEL: 0.1 mg/m^3	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria.
Naphthalene	REL: 10 ppm N STEL: 15 ppm PEL: 10 ppm	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage.

PAHs	REL: 0.1 mg/m^3 PEL: 0.2 mg/m^3	Effects reported from occupational exposure to PAHs include chronic bronchitis, chronic cough irritation, bronchogenic cancer, dermatitis, cutaneous photosensitization, and pilosebaceous reactions. Reported health effects associated with chronic exposure to coal tar and its by-products (e.g., PAHs): Skin: erythema, burns, and warts on sun-exposed areas with progression to cancer. The toxic effects of coal tar are enhanced by exposure to ultraviolet light. Eyes: irritation and photosensitivity. Respiratory system: cough, bronchitis, and bronchogenic cancer. Gastrointestinal system: leukoplakia, buccal-pharyngeal cancer, and cancer of the lip. Hematopoietic system: leukemia (inconclusive) and lymphoma. Genitourinary system: hematuria and kidney and bladder cancers.
Toluene	REL: 100 ppm N STEL: 150 ppm PEL: 200 ppm PEL C: 300 ppm; 10-min max peak: 500 ppm	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Xylene	REL: 100 ppm N STEL: 150 ppm PEL: 100 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Notes: REL: Recommended exposure limit (NIOSH) PEL: Permissable exposure limits (OSHA) STEL: Short-term exposure limit N: NIOSH O: OSHA C: Ceiling		

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

2.3 Training

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

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

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

2.4 Medical Surveillance Program

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

2.5 Site Work Zones

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

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Appropriate barriers will be set up to secure the area and prevent any unauthorized personnel from approaching within 15 feet of the work area.

Site Work Zones			
Task	**Exclusion Zone**	**CRZ**	**Support Zone**
Soil Excavation	15 feet from excavation border and excavation equipment or vehicles	15 feet from excavation border and excavation equipment or vehicles	As Needed

2.6 Air Monitoring and Personal Protective Equipment

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

2.6.1 Work Zone Air Monitoring and Level of Personal Protection

Real time air monitoring will be performed with the PID and Dust Trak. Measurements will be taken prior to commencement of work and continuously during the work, as outlined in the following table. Measurements will be made as close to the workers as practicable and at the breathing height of the workers. The SSO shall set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The response action and level of personal protection equipment will be based on the work zone air monitoring action levels described in the table below.

Instrument	Action Level	Response Action
PID	Less than 5 ppm in breathing zone	Level D or D-Modified
	Between 5 ppm and 50 ppm	Level C
	More than 50 ppm	Stop work. Resume work when readings are less than 50 ppm.
Dust Trak	Less than 1.25 mg/m^3 above background in breathing zone	Level D or D-Modified
	More than 1.25 mg/m^3 above background in breathing zone	Stop work. Resume work when readings are less than 1.25 mg/m^3.
mg/m^3 = milligrams per cubic meter ppm = parts per million		

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

AKRF field personnel and other site personnel shall wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in this section.

Personal Protection Equipment Requirements		
LEVEL OF PROTECTION & PPE		**All Tasks**
Level D (**X**) Steel Toe Shoes (**X**) Hard Hat (within 25 ft of drill rig/excavator) (**X**) Work Gloves	(**X**) Safety Glasses ( ) Face Shield (**X**) Ear Plugs (within 25 ft of drill rig/excavator) (**X**) Nitrile Gloves (**X**) Tyvek for drill operator if	Yes

Personal Protection Equipment Requirements		
LEVEL OF PROTECTION & PPE		**All Tasks**
	NAPL present	
Level C *(in addition to Level D)* (**X**) Half-Face Respirator OR (**X**) Full Face Respirator ( ) Full-Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (**X**) Dual Organic/ Particulate Cartridge	If PID > 10 ppm (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected).		

2.6.2 Community Air Monitoring Plan

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

VOC Monitoring

Continuous monitoring for VOCs will be conducted when intrusive activities will breach the Cover System. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. VOCs will be monitored continuously at the downwind perimeter of the exclusion zone. Monitoring will be conducted with a photoionization detector (PID) equipped with a 10.6 or 11.7 eV lamp capable of calculating 15-minute running average concentrations.

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

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

All 15-minute readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Exceedances of action levels listed in this CAMP will be reported to NYSDEC and NYSDOH Project Managers.

Dust Monitoring

Continuous monitoring will be conducted when intrusive activities will breach the Cover System. Upwind dust particulate concentrations will be measured at the start of each workday and periodically thereafter to establish background concentrations. Dust particulate concentrations will be monitored continuously at the downwind perimeter of the exclusion zone. A DustTrak® dust monitor or equivalent capable of measureing particulate matter less than 10 micrometers in size (PM-10) will be used to measure concentration of total particulate matter during field activities.

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

- If the downwind PM-10 particulate level is 0.1 mg/m^3 greater than background (upwind perimeter) for a 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 0.150 mg/m^3 above background levels 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 0.150 mg/m^3 above background levels, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate levels under 0.150 mg/m^3 above background levels and in preventing visible dust migration.

All 15-minute readings will be recorded and available for NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, will also be recorded.

Exceedances of action levels listed in this CAMP will be reported to NYSDEC and NYSDOH Project Managers.

2.7 General Work Practices

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

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

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to the Saint Joseph's Medical Center Emergency in Yonkers by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

3.1 Hospital Directions

Hospital Name:	Saint Joseph's Medical Center Emergency
Phone Number:	(914) 378-7000
Address/Location:	127 South Broadway, Yonkers, NY 10701
Directions:	Head WEST on Asburton Avenue toward Warburton Head SOUTH on Warburton toward Main Street Continue onto NY State Reference Route 984H/Riverdale Avenue Turn LEFT onto Prospect Street Turn RIGHT onto South Broadway Emergency room will be on the RIGHT

3.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF, Inc.	Patrick McHugh	Project Manager	(914) 922-2387
Avalon Yonkers Sun Sites, LLC	TBD	TBD	TBD
New York State Department of Environmental Conservation	Matthew Hubicki	Project Number	(518) 402-9605
New York State Department of Health	Sarita Wagh	-	(518) 402-7860
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

4.0 APPROVAL & ACKNOWLEDGMENTS OF HASP

APPROVAL

Signed: ______________________________ Date: ______________________________

AKRF Project Manager

Signed: ______________________________ Date: ______________________________

AKRF Health and Safety Officer

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

AFFIDAVIT

I,_____________________(name), of__________________________(company name), have read the Health and Safety Plan (HASP) for the Polychrome Manufacturing Site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed: ______________________ Company: ____________________ Date: ________

Signed: ______________________ Company: ____________________ Date: ________

Signed: ______________________ Company: ____________________ Date: ________

Signed: ______________________ Company: ____________________ Date: ________

Signed: ______________________ Company: ____________________ Date: ________

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Signed: ______________________ Company: ____________________ Date: ________

Signed: ______________________ Company: ____________________ Date: ________

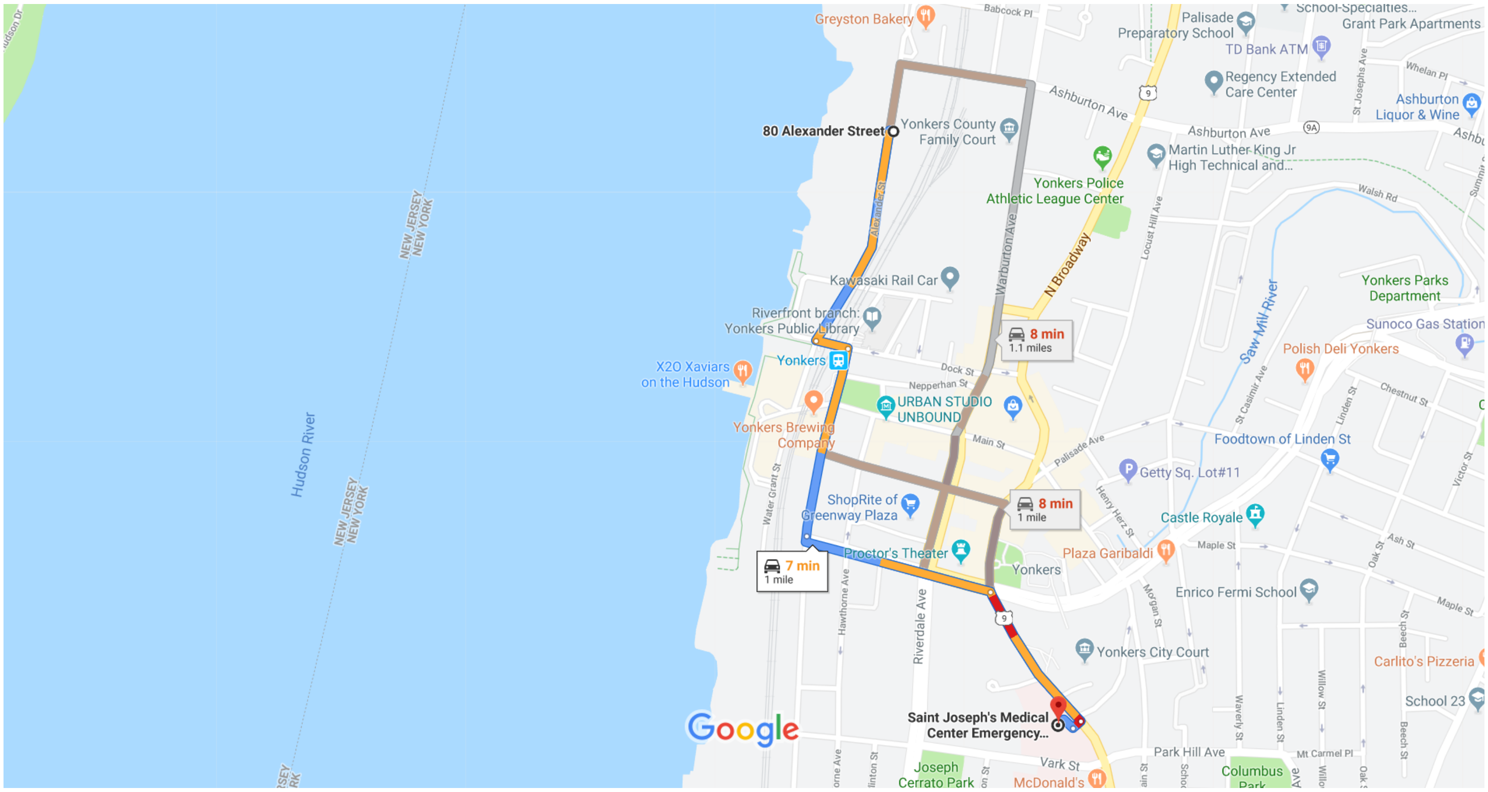
Signed: ______________________ Company: ____________________ Date: ________

FIGURE 1 – HOSPITAL ROUTE MAP

Google Maps

80 Alexander St, Yonkers, NY 10701 to Saint Joseph's Medical Center Emergency Department

Drive 1.0 mile, 7 min



Map data ©2019 500 ft

via Alexander St	Fastest route, despite the usual traffic	7 min, 1.0 mile
via Warburton Ave	Heavy traffic, as usual	8 min, 1.1 miles
via Alexander St and S Broadway	Heavy traffic, as usual	8 min, 1.0 mile

Explore Saint Joseph's Medical Center Emergency Department

Restaurants Hotels Gas stations Parking Lots More

ATTACHMENT A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

Arsenic - ToxFAQs™

CAS # 7440-38-2

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

HIGHLIGHTS: Exposure to higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 1,149 of the 1,684 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

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

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

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

Skin contact with inorganic arsenic may cause redness and swelling.

Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies in animals show that some simple organic arsenic compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

How can arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ scores. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant females, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

How can families reduce the risks of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.
- If you work in a job that may expose you to arsenic, be aware that you may carry arsenic home on your clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

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

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

Has the federal government made recommendations to protect human health?

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

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

References

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

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636

ToxFAQs™ Internet address via WWW is http://www.atsdr.cdc.gov/toxfaqs/index.asp.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BENZENE
CAS # 71-43-2

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

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

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

What is benzene?
(Pronounced bĕn′zēn′)

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

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

What happens to benzene when it enters the environment?

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

How might I be exposed to benzene?

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

How can benzene affect my health?

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

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

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

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

How likely is benzene to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

Glossary

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

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

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

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

References

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

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

Chromium - ToxFAQs™

CAS # 7440-47-3

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

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

What is chromium?

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

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

What happens to chromium when it enters the environment?

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

How might I be exposed to chromium?

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

How can chromium affect my health?

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

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

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

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

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

Chromium

CAS # 7440-47-3

How likely is chromium to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have determined that chromium(VI) compounds are known human carcinogens.

In workers, inhalation of chromium(VI) has been shown to cause lung cancer. Chromium(VI) also causes lung cancer in animals. An increase in stomach tumors was observed in humans and animals exposed to chromium(VI) in drinking water.

How can chromium affect children?

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

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

How can families reduce the risk of exposure to chromium?

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

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

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

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

Has the federal government made recommendations to protect human health?

The EPA has established a maximum contaminant level of 0.1 mg/L for total chromium in drinking water.

The FDA has determined that the chromium concentration in bottled drinking water should not exceed 0.1 mg/L.

The Occupational Health and Safety Administration (OSHA) has limited workers' exposure to an average of 0.005 mg/m^3 chromium(VI), 0.5 mg/m^3 chromium(III), and 1.0 mg/m^3 chromium(0) for an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological Profile for Chromium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636

ToxFAQs™ Internet address via WWW is http://www.atsdr.cdc.gov/toxfaqs/index.asp.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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ETHYLBENZENE
CAS # 100-41-4

Agency for Toxic Substances and Disease Registry ToxFAQs **June 1999**

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

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

What is ethylbenzene?
(Pronounced ĕth′ əl bĕn′ zēn′)

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

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

What happens to ethylbenzene when it enters the environment?

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

How might I be exposed to ethylbenzene?

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

How can ethylbenzene affect my health?

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

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

How likely is ethylbenzene to cause cancer?

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

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

How can ethylbenzene affect children?

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

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

How can families reduce the risk of exposure to ethylbenzene?

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

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

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

FUEL OILS

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

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

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

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

What are fuel oils?
(Pronounced fyo͞o′əl oilz)

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

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

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

What happens to fuel oils when they enter the environment?

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

How might I be exposed to fuel oils?

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

How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene stoves for cooking do not seem to have any health problems related to their exposure.

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

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

How likely are fuel oils to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

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

References

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

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

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LEAD

CAS # 7439-92-1

Division of Toxicology and Environmental Medicine ToxFAQs™ **August 2007**

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

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

What is lead?

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

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

What happens to lead when it enters the environment?

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

How might I be exposed to lead?

❏ Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.
❏ Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
❏ Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.
❏ Using health-care products or folk remedies that contain lead.

How can lead affect my health?

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

How likely is lead to cause cancer?

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

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

How can lead affect children?

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

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

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

How can families reduce the risks of exposure to lead?

❏ Avoid exposure to sources of lead.

❏ Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint.

❏ If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.

❏ Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children

❏ If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

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

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

Has the federal government made recommendations to protect human health?

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

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

References

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

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

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MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs **April 1999**

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

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

What is mercury?
(Pronounced mŭr′kyə-rē)

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

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

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

What happens to mercury when it enters the environment?

- Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- Methylmercury may be formed in water and soil by small organisms called bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

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

How can mercury affect my health?

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

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

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

How can mercury affect children?

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

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

How can families reduce the risk of exposure to mercury?

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

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

Pregnant women and children should keep away from rooms where liquid mercury has been used.

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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

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NAPHTHALENE CAS # 91-20-3

1-METHYLNAPHTHALENE CAS # 90-12-0

2-METHYLNAPHTHALENE CAS # 91-57-6

Division of Toxicology ToxFAQs™ August 2005

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

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

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

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

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

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

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

❏ Naphthalene enters the environment from industrial and domestic sources, and from accidental spills.
❏ Naphthalene can dissolve in water to a limited degree and may be present in drinking water from wells close to hazardous waste sites and landfills.
❏ Naphthalene can become weakly attached to soil or pass through soil into underground water.
❏ In air, moisture and sunlight break it down within 1 day. In water, bacteria break it down or it evaporates into the air.
❏ Naphthalene does not accumulate in the flesh of animals or fish that you might eat.
❏ 1-Methylnaphthalene and 2-methylnaphthalene are expected to act like naphthalene in air, water, or soil because they have similar chemical and physical properties.

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

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

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

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

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

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

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

There is no direct evidence in humans that naphthalene, 1-methylnaphthalene, or 2-methylnaphthalene cause cancer. However, cancer from naphthalene exposure has been seen in animal studies. Some female mice that breathed naphthalene vapors daily for a lifetime developed lung tumors. Some male and female rats exposed to naphthalene in a similar manner also developed nose tumors.

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

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

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

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

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

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

❏ Families can reduce the risks of exposure to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by avoiding smoking tobacco, generating smoke during cooking, or using fireplaces or heating appliances in the their homes.

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

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

References

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

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POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Agency for Toxic Substances and Disease Registry ToxFAQs **September 1996**

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

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

What are polycyclic aromatic hydrocarbons?

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

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

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

What happens to PAHs when they enter the environment?

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

How might I be exposed to PAHs?

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

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

How can PAHs affect my health?

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

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

How likely are PAHs to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

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

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

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TOLUENE
CAS # 108-88-3

Division of Toxicology ToxFAQs™ **February 2001**

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

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

What is toluene?

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

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

What happens to toluene when it enters the environment?

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

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

❏ Toluene does not usually stay in the environment long.

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

How might I be exposed to toluene?

❏ Breathing contaminated workplace air or automobile exhaust.

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

❏ Drinking contaminated well-water.

❏ Living near uncontrolled hazardous waste sites containing toluene products.

How can toluene affect my health?

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

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

High levels of toluene may affect your kidneys.

How likely is toluene to cause cancer?

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

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

How can toluene affect children?

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

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

How can families reduce the risk of exposure to toluene?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

References

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

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

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

XYLENE
CAS # 1330-20-7

Agency for Toxic Substances and Disease Registry ToxFAQs September 1996

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

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

What is xylene?

(Pronounced zī′lēn)

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

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

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

What happens to xylene when it enters the environment?

- Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- It evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

How might I be exposed to xylene?

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

How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

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

How likely is xylene to cause cancer?

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

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

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

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

Has the federal government made recommendations to protect human health?

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

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

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

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

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

Glossary

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

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

References

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

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

ATTACHMENT B

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION

The following section is based upon information provided by the CDC Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants) and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis encephalitis is to avoid mosquito bites. To reduce the chance of mosquito contact:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for use, as printed on the product.

ATTACHMENT C

REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: ______________ Project Name/Number: ______________________________

Report Date: ______________ Project Manager Name: ______________________________

Summary of any violations of procedures occurring that week:

____

____

____

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

____

____

____

____

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

____

____

____

Comments:

____

____

____

Name: _________________________ Company: ______________________________

Signature: _________________________ Title: ______________________________

INCIDENT REPORT FORM

Date of Report: ______________________________

Injured: ______________________________

Employer: ______________________________

Site: ____________________ Site Location: ____________________

Report Prepared By: ____________________ ____________________

Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

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

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

____

____

____

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____

____

____

____

____

____

WITNESS TO ACCIDENT/INCIDENT:

Name:	____________	Company:	____________
Address:	____________	Address:	____________
Phone No.:	____________	Phone No.:	____________
Name:	____________	Company:	____________
Address:	____________	Address:	____________
Phone No.:	____________	Phone No.:	____________

INJURED - ILL:

Name: ____________________ SSN: ____________________

Address: ____________________ Age: ____________________

Length of Service: ____________________ Time on Present Job: ____________________

Time/Classification: ____________________

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ___ Non-disabling ___ Fatality

____ Medical Treatment ___ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: ____________________

NATURE OF INJURY OR ILLNESS: ____________________

____

____

CLASSIFICATION OF INJURY:

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

Part of Body Affected: ____________________

Degree of Disability: ____________________

Date Medical Care was Received: ____________________

Where Medical Care was Received: ____________________

Address (if off-site): ____________________

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

PROPERTY DAMAGE:

Description of Damage: ____

Cost of Damage: $ ____

ACCIDENT/INCIDENT LOCATION: ____

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

Was weather a factor?: ____

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

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

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

Modifications:

Was injured using required equipment?:

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

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

ACCIDENT/INCIDENT REPORT REVIEWED BY:

SSO Name Printed	SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

Signature	Title
Signature	Title
Signature	Title

ACCIDENT/INCIDENT FOLLOW-UP: Date:

Outcome of accident/incident:

Physician's recommendations:

Date injured returned to work:

Follow-up performed by:

Signature	Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT D

EMERGENCY HAND SIGNALS

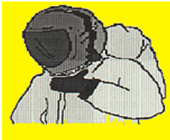
EMERGENCY SIGNALS

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

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

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATH!



Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

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

NEED ASSISTANCE!

Hands on top of head

OKAY! – I'M ALL RIGHT!

- I UNDERSTAND!

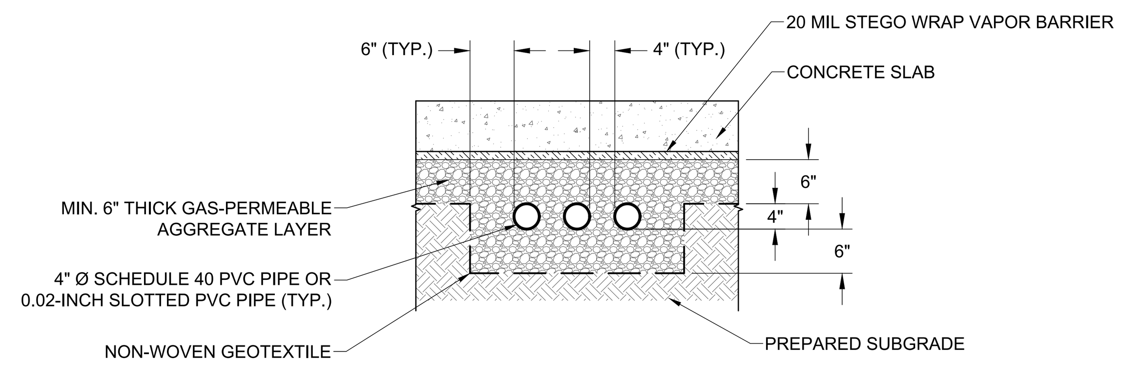
Thumbs up

NO! - NEGATIVE!

Thumbs down

APPENDIX E

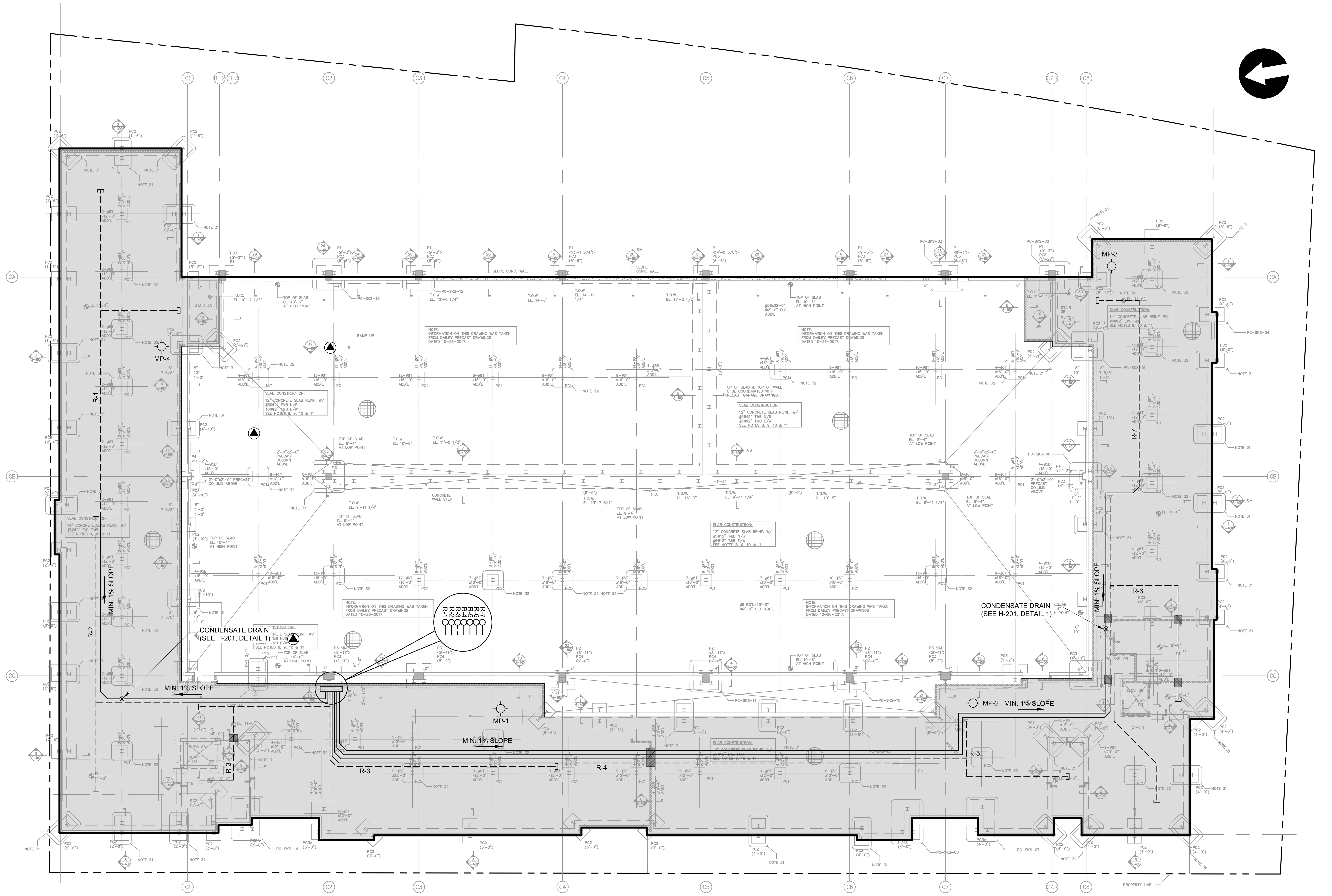
SSDS AS-BUILT, DRAWINGS, AND MANUFACTURER'S SPECIFICATIONS



2 H200 TYPICAL PIPING TRENCH
SCALE: N.T.S

LEGEND

- EXTENT OF VAPOR BARRIER UNDER SLAB
- EXTENT OF GAS PERMEABLE AGGREGATE UNDER SLAB
- PIPE SLEEVE THROUGH GRADE BEAM
- 4" Ø SLOTTED SCHEDULE 40 PVC PIPE WITH PVC END CAP
- 4" Ø SOLID SCHEDULE 40 PVC PIPE
- R-3 4" Ø RISER SLAB PENETRATION
- VACUUM MONITORING POINT
- MONITORING WELL



1 H200 SUBSLAB DEPRESSURIZATION SYSTEM LAYOUT

0 8 16 32
SCALE IN FEET

NOTE: PIPE SPACING NOT TO SCALE

MONITORING POINT LOCATIONS		
ID	COLUMN LOCATION	ROOM
MP-1	C4-CC	ELECTRICAL ROOM
MP-2	C7-CC	MECHANICAL ROOM
MP-3	C8-CA	CORRIDOR
MP-4	C1-CA	CORRIDOR

NOTES

1. THIS PLAN SHALL NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL OR OTHER REFERENCE PURPOSES EXCEPT FOR THE SUB-SLAB DEPRESSURIZATION SYSTEM AND VAPOR BARRIER.

2. HORIZONTAL SUB-SLAB DEPRESSURIZATION SYSTEM PIPE SLOPED A MINIMUM OF 1% UNIFORMLY TOWARDS THE SUB-SLAB DEPRESSURIZATION SYSTEM SLOTTED PIPING OR CONDENSATE DRAIN.

3. BASE MAP FROM PERKINS EASTMAN "BLDG 3 S130 FDN.DWG", S-130 SERIES, 01-02-2019..

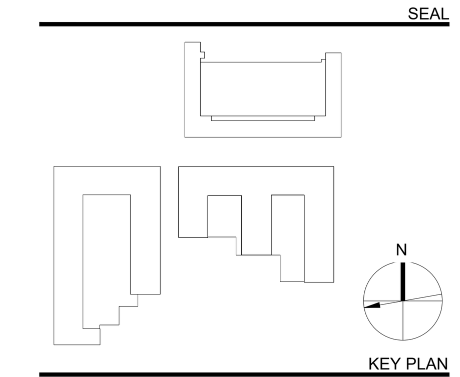
4. GAS PERMEABLE AGGREGATE NOMINAL SIZE OF 1 INCH TO 1/2 INCH AND COMFORM TO ASTM C33 STANDARD SPECIFICATION FOR CONCRETE AGGREGATE SIZE #5 AS PER THE TABLE BELOW:

ASTM #5 AGGREGATE GRADATION
(FOR PIPE TRENCHES)

SIEVE SIZE	PERCENT FINER BY WEIGHT
1.5 inch	100
1 inch	90 to 100
3/4 inch	20 to 55
1/2 inch	0 to 10
3/8 inch	0 to 5

NO.	DATE	
1	02/21/2019	75% SET
2	02/22/2019	75% SET (REVISION 1)
3	03/28/2019	100% CD SET
4	12/12/2019	AS-BUILT

SEAL



Perkins Eastman
422 SUMMER STREET
STAMFORD, CT 06901
T. 203.251.7400
F. 203.251.7474

Owner:
AvalonBay
1499 POST ROAD, SECOND FL
FAIRFIELD, CT 06824

Civil / Site:
PS&S
1 LARKIN PLAZA
2ND FL
YONKERS, NY 10701

Landscape:
Topia
5055 NORTH HARBOR DR, SUITE 200
SAN DIEGO, CA 92106

Structural:
VEITAS & VEITAS ENGINEERS, INC.
639 GRANITE STREET
BRAINTREE, MA 02184

MEP/FP:
R.W. SULLIVAN ENGINEERING
THE SCHRAFFT CENTER
529 MAIN STREET, SUITE 203
BOSTON, MA 02129

ENVIRONMENTAL:
AKRF
THE SCHRAFFT CENTER
34 SOUTH BROADWAY
4TH FLOOR
WHITE PLAINS, NY 10601

PROJECT TITLE:
AVALON YONKERS
BUILDING 3

ALEXANDER ST, YONKERS, NY

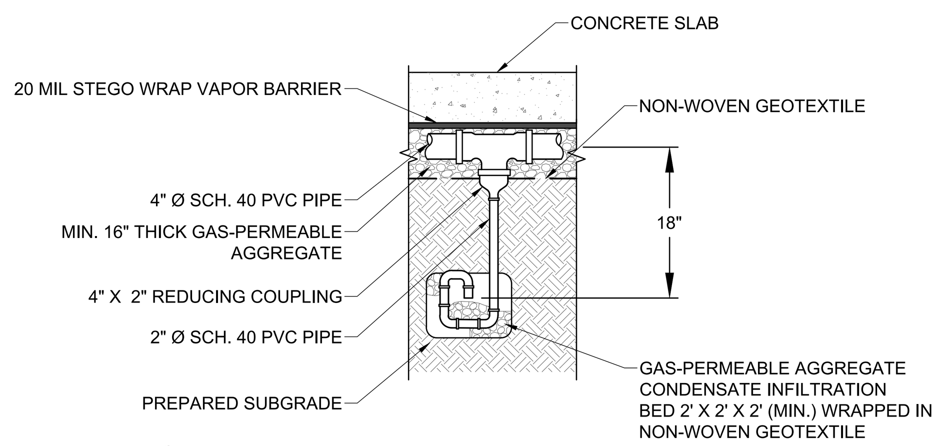
PROJECT No: 65190.00

DRAWING TITLE:
SSDS AND VAPOR BARRIER PLAN

SCALE: AS NOTED

H-200

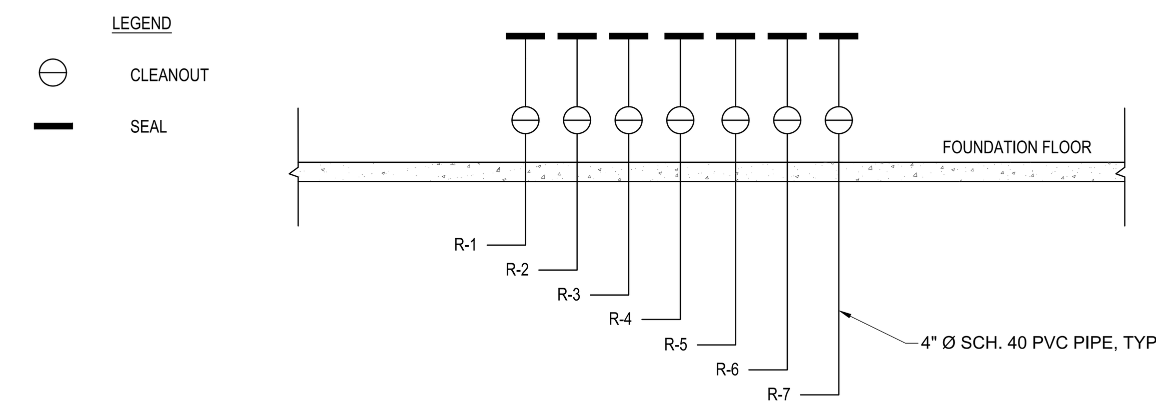
NO.	DATE	
1	02/21/2019	75% SET
2	02/22/2019	75% SET (REVISION 1)
3	03/28/2019	100% CD SET
4	12/12/2019	AS-BUILT



NOTE:

1. INSTALL, AS NECESSARY, AT ALL LOW POINTS IN SUB-SLAB DEPRESSURIZATION SYSTEM PIPING WHEN PIPING CANNOT BE SLOPED TO SLOTTED PIPING.

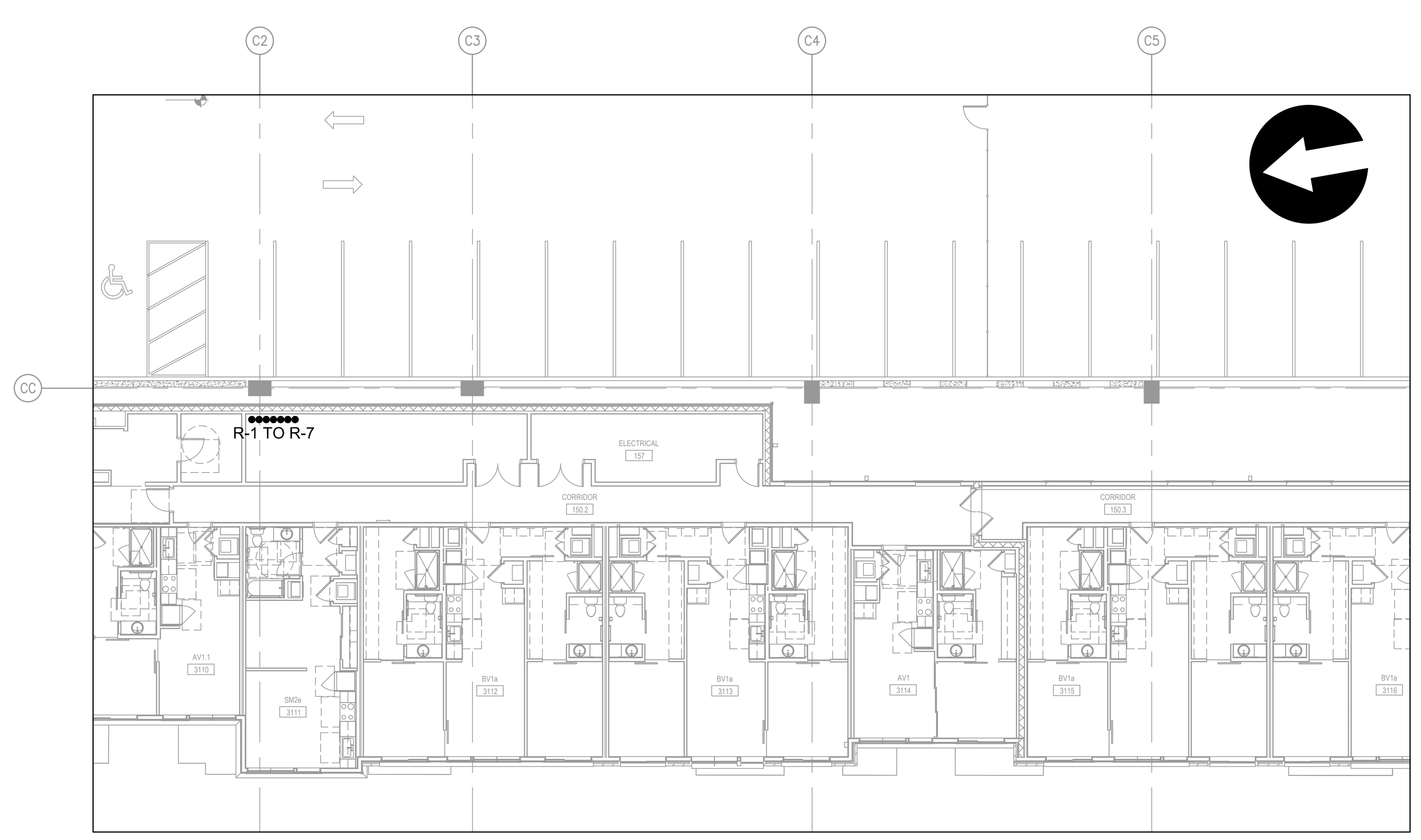
1 H-201 TYPICAL CONDENSATE DRAIN DETAIL
Not to Scale



2 H-201 PIPING AND INSTRUMENTATION DIAGRAM
Not to Scale

GENERAL NOTES:

1. ABOVE TRADE APPURTENANCES TO BE INSTALLED AS PER MARCH 28, 2019 SSDS SUBMITTED TO NYSDEC. UPDATED AS-BUILT TO BE SUBMITTED TO NYSDEC AS PART OF SITE MANAGEMENT ACTIVITIES.



3 H-201 LEVEL 1

0 8 16 32
SCALE IN FEET

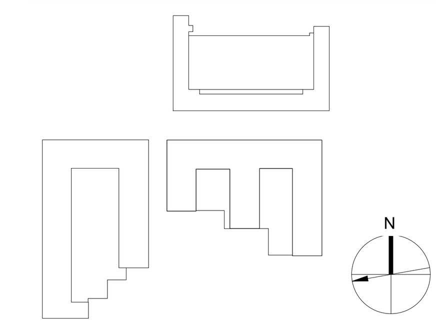
LEGEND

R-1 ● VERTICAL RISER AND IDENTIFICATION NUMBER

NOTE:

1. R-1 THROUGH R-7 STUBBED UP THROUGH GROUND FLOOR AND WILL BE ADDRESSED IN 2020, PRIOR TO TEMPORARY OF FULL CERTIFICATE OF OCCUPANCY.

SEAL



KEY PLAN

Perkins Eastman
422 SUMMER STREET
STAMFORD, CT 06901
T. 203.251.7400
F. 203.251.7474

Owner:
AvalonBay
1499 POST ROAD, SECOND FL
FAIRFIELD, CT 06824

Civil / Site:
PS&S
1 LARKIN PLAZA
2ND FL
YONKERS, NY 10701

Landscape:
Topia
5055 NORTH HARBOR DR, SUITE 200
SAN DIEGO, CA 92106

Structural:
VEITAS & VEITAS ENGINEERS, INC.
639 GRANITE STREET
BRAINTREE, MA 02184

MEP/FP:
R.W. SULLIVAN ENGINEERING
THE SCHRAFFT CENTER
529 MAIN STREET, SUITE 203
BOSTON, MA 02129

ENVIRONMENTAL:
AKRF
THE SCHRAFFT CENTER
34 SOUTH BROADWAY
4TH FLOOR
WHITE PLAINS, NY 10601

PROJECT TITLE:

AVALON YONKERS
BUILDING 3

ALEXANDER ST, YONKERS, NY

PROJECT No: 65190.00

DRAWING TITLE:

SSDS RISER PLAN, DETAILS AND P&ID

SCALE: AS NOTED

H-201

Rn3 Inline Radon Fan

Item Number: 89053
Variant: 120V 1~ 60Hz

• Use for **Medium Suction, High Airflow** applications
• UV resistant, UL Listed durable plastic
• UL Listed for use in commercial applications
• Watertight electrical terminal box
• Totally enclosed for protection
• Automatic reset thermal overload protection
• Zero leakage

Active radon mitigation systems employ specialized fans to exhaust radioactive radon gas from underneath building structures via a sealed pipe system. These systems are designed to remove radon gas before it migrates into the building envelope.

The **Rn3** models is an excellent choice for systems with elevated radon levels, poor communication, multiple suction points and/or large sub slab footprint. High air flow, medium suction.

The fan features a fully sealed plastic housing. The inlet and outlet pieces of the housing are joined via a vibration welding process. The process uses transverse, reciprocating motion under pressure at the point of contact. The friction produces heat that melts the thermoplastic material at the interface. The melted material quickly re-solidifies, resulting in a fused, single piece housing. The fused seam is inherently air tight, very strong and permanent. This air-tight product ensures that efficiency is not lost and contaminants are not spilled due to leakage.

A large electrical wiring enclosure is designed into the fan housing, making electrical installation easier. Thermal overload protected with automatic reset. The fan can be mounted both indoor, outdoor and in wet locations.

Performance certified by **HVI**; safety certified by **UL**.

To simplify installation, use **FRIK 6x3** or **FRIK 6x4** Installation kits.

Technical parameters

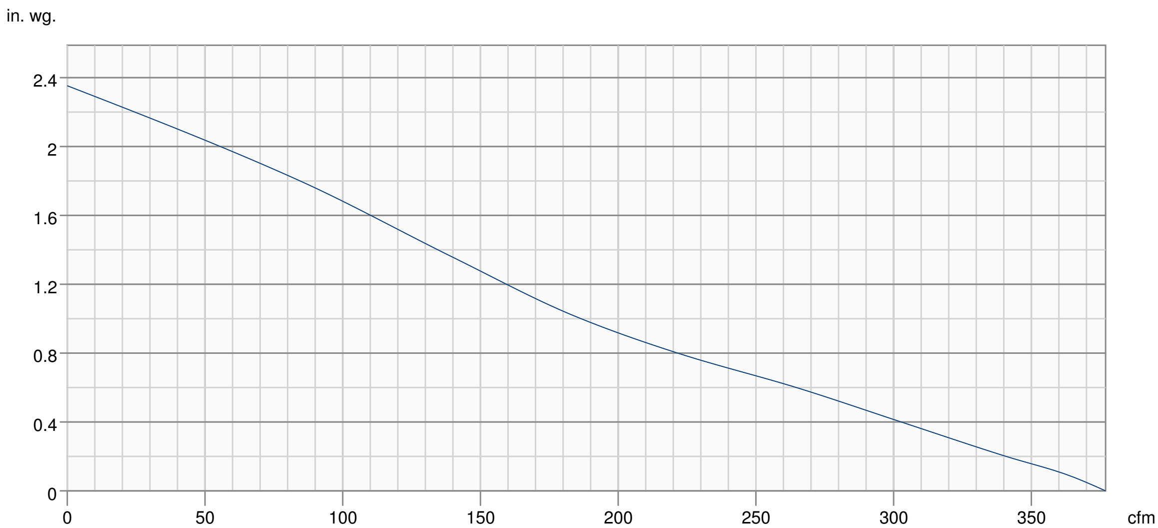
Norminal data		
Voltage (Nominal)	120	V
Frequency	60	Hz
Phase(s)	1~	
Input power	141	W
Input current	1.2	A
Impeller speed	2,782	r.p.m.
Air flow	max 377.0	cfm
Temperature of transported air	max 140	°F

Protection/Classification	
Enclosure class, motor	IP44
Insulation class	B

Dimensions and weights		
Duct dimension; Circular, inlet	6	in.
Duct dimension; Circular, outlet	6	in.
Weight	6.3	lb

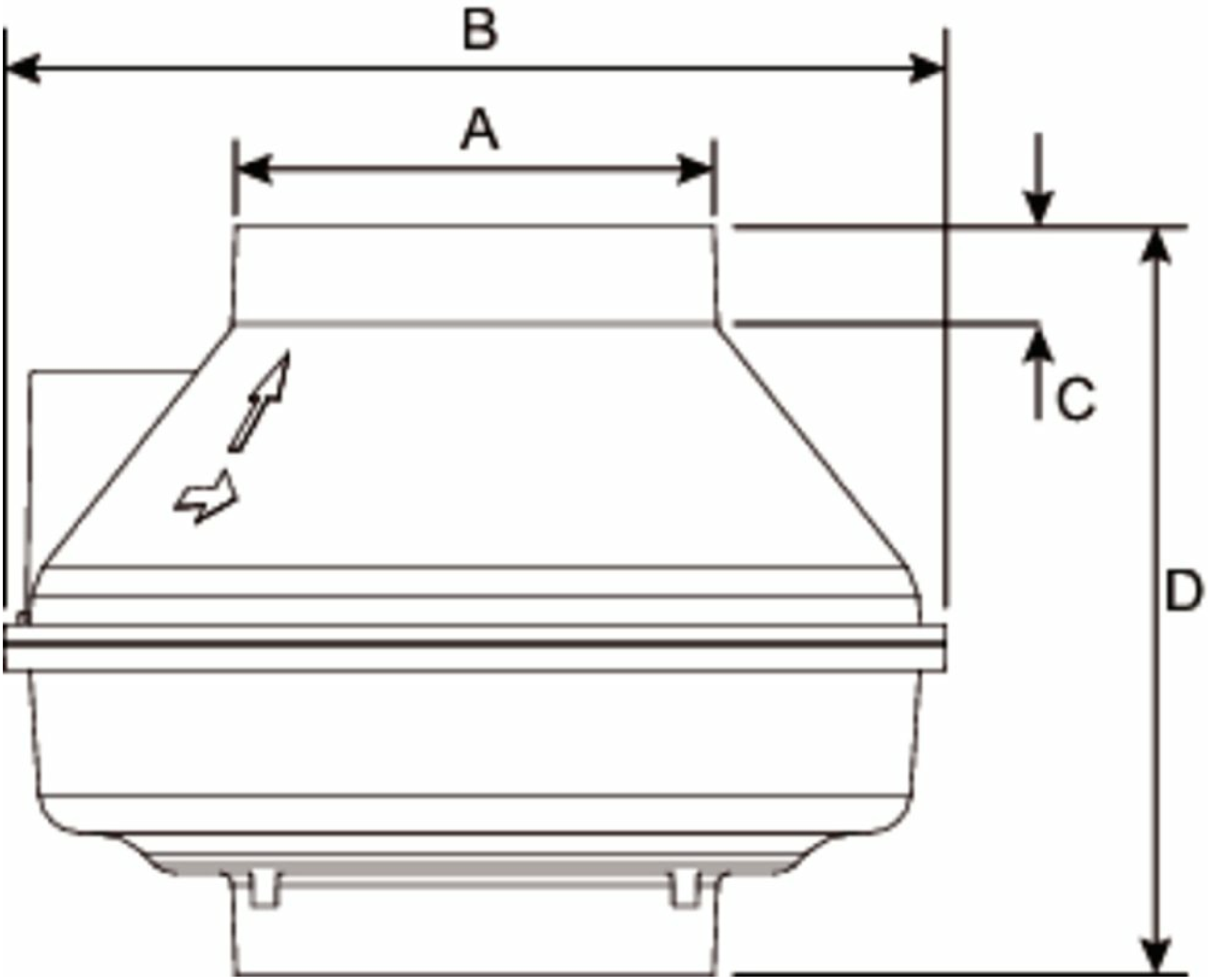
Optional	
Duct connection type	Circular

Performance curve



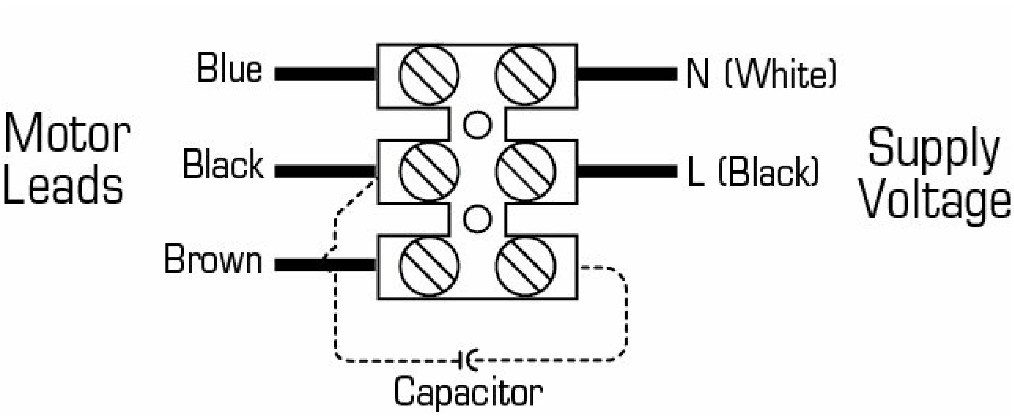
Hydraulic data	
Required air flow	-
Required static pressure	-
Working air flow	-
Working static pressure	-
Air density	0.075 lb/ft³
Power	-
Fan control - RPM	-
Current	-
SFP	-
Control voltage	-
Supply voltage	-

Dimensions



Model	A	B	C	D
Rn1	4 15/32 (114)	10 (254)	1 1/4 (32)	9 1/4 (235)
Rn2	4 15/32 (114)	10 (254)	1 1/4 (32)	9 1/4 (235)
Rn3	5 7/8 (149)	11 1/2 (292)	1 1/4 (32)	9 1/4 (235)
Dimensions in inches (mm).				

Wiring


Blue
N (White)
Motor Leads
Black
L (Black)
Supply Voltage
Brown
Capacitor

APPENDIX F

QUALITY ASSURANCE PROJECT PLAN

POLYCHROME EAST SITE

80-94 ALEXANDER STREET

YONKERS, NEW YORK

Quality Assurance Project Plan

NYSDEC BCP Number: C360098

AKRF Project Number: 180132

Prepared for:

Avalon Yonkers Sun Sites, LLC

1499 Post Road

Fairfield, Connecticut 06824

Prepared by:

AKRF, Inc
34 South Broadway, Suite 401
White Plains, New York 10601
(914) 949-7336

JULY 2019

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TABLES

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during Site Management activities at the Polychrome East Site (the Site) by Avalon Yonkers Sun Sites, LLC (the Volunteer). The Site is also identified as Section 2, Block 2608, Lot 1 (consolidated in October 2019 from Lots 29, 35, and 37). The Site is currently in the New York State Brownfield Cleanup Program (BCP) as Site No. C360098, which is administered by New York State Department of Environmental Conservation (NYSDEC). The objective of the QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental investigative, sampling, and remedial activities conducted during Site remediation and excavation. Adherence to this QAPP will ensure that defensible data will be obtained during all environmental work at the Site.

2.0 PROJECT TEAM

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

2.1 Project Director

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management, and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team and the NYSDEC to ensure a smooth flow of information between involved parties. Marc Godick will serve as the project director for the SMP. Mr. Godick's resume is included in Attachment A.

2.2 Project Manager

The project manager will be responsible for directing and coordinating all elements of the SMP. He will prepare reports and participate in meetings with the Site owner and/or the NYSDEC. Patrick McHugh will serve as the project manager for the SMP. Mr. McHugh's resume is included in Attachment A.

2.3 Field Team Leader

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plan and Health and Safety Plan (HASP). He will report to the Project Manager on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified, responsible person, able to act professionally and promptly during soil disturbing activities. Stephen Schmid will be the field team leader as necessary for activities occurring under the SMP. Mr. Schmid's resume is included in Attachment A.

2.4 Project Quality Assurance/Quality Control Officer

The Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the QAPP. She will review the procedures with all personnel prior to commencing any fieldwork and will assess implementation of the required procedures. Rebecca Kinal will serve as the QA/QC officer for the SMP.

2.5 Laboratory Quality Assurance/Quality Control Officer

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. He/she will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued. He/she will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be determined upon selection of a contract laboratory(s) for the SMP sampling activities.

2.6 Third Party Data Validator

The third-party data validator will be responsible for reviewing the final data packages for soil, groundwater, and soil vapor and preparing a Data Usability Summary Report (DUSR) that will provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the laboratory analyses for the investigation. The third-party data validator will be Lori Beyer of L.A.B. Validation Corporation of East Northrop, New York.

3.0 STANDARD OPERATING PROCEDURES

The following sections describe the standard operating procedures (SOPs) for the environmental monitoring/sampling activities included in the SMP. During these operations, safety monitoring will be performed as described in the project Health and Safety Plan (HASP) and all field personnel will wear appropriate personal protective equipment.

3.1 Excavation Work

3.1.1 Excavation of Soil Below the Cover System

Previous investigations included the excavation and removal of several underground storage tanks (USTs), subsurface soil borings and groundwater sampling, which indicated petroleum contamination may be present below the Site Cover System and elevated concentrations of metals, semivolatile organic compounds (SVOCs), and petroleum-related volatile organic compounds (VOCs) in soil and groundwater may be present.

Any additional contaminated soil, when encountered, would be excavated, properly characterized and removed for off-site disposal in accordance with the Excavation Work Plan (EWP) located in Appendix C of the SMP. Soil sampling will be conducted as necessary in the event that additional contamination is discovered at the Site.

3.1.2 Soil Screening

During the excavation work, the excavated material will be inspected by AKRF field personnel for evidence of contamination (i.e., separate phase liquid, staining, sheening and/or odors) and field-screened using a photoionization detector (PID) equipped with a 10.6 or 11.7 eV lamp calibrated at the start of each day in accordance with the manufacturer’s instructions.

3.1.3 Tank Removal (if encountered)

In the event that a tank(s) is encountered at the Site, the tank(s) and any appurtenances will be cleaned, removed and disposed of in accordance with accepted industry standards and applicable Federal, State, and local regulatory agency requirements. Tank and soil removal from the vicinity of discovered underground storage tanks will be conducted in consultation with the NYSDEC.

Typical tank removal procedures are summarized below:

1. Open fill cap or vent pipe and measure for product. Collect a sample of the product. Tank contents will be sampled in accordance with applicable federal, state and local requirements and tested in accordance with the requirements of the receiving facility. Proper disposal of tank contents at an approved facility will be dictated by sample results.
2. Excavate to expose the tank. Vacuum liquid tank contents and pumpable tank bottom residue.
3. Excavate around the tank with care to avoid release of tank and piping contents. Hand excavation around the tank may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a photoionization (PID), a combustible gas indicator (CGI), and an oxygen meter.
4. Inert the tank of flammable vapors using dry ice and verify using an oxygen meter (less than 7 percent). An access hole will be cut in the tank and the tank will be thoroughly cleaned of residual liquids and sludges.
5. Entry of the tank, if necessary, shall be conducted in conformance with OSHA confined space requirements.
6. Remaining fuels, loose slurry, sludge materials and wastewater will be collected in DOT-approved drums, sampled and analyzed for disposal characterization. After disposal characterization, waste material will be removed and disposed of in accordance with applicable regulations.
7. Remove the tank and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the site and disposed of according to applicable regulations with proper documentation. Remove and dispose of all concrete tank support structures or vaults as encountered.
8. After tank removal, examine for evidence of petroleum releases in accordance with NYSDEC requirements.
9. Suspect materials will be field-screened with a PID. If soil contamination is present, excavate and remove contaminated soil from the tank areas in EWP (Appendix C of the SMP). Endpoint sampling will be conducted as directed by the NYSDEC.
10. Photo-document all procedures and record all procedures in a bound field notebook.

3.2 Excavation Backfill/Material Reuse On-Site

See the EWP (Appendix C of the SMP).

3.3 Decontamination Of Sampling Equipment

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

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

3.4 Management Of Investigation Derived Waste (Idw)

All excavated soil will be stockpiled and disposed of in accordance with the EWP.

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

If field evidence of gross contamination is identified, decontamination wastewater will be drummed and staged near the point of generation, and will be properly disposed of off-site based on laboratory results. If free of visible contamination, disposable personal protective equipment (PPE) and sampling equipment (scoops, gloves, rope, etc.) will be placed in heavy-duty plastic bags and disposed of properly.

4.0 SAMPLING AND LABORATORY PROCEDURES

4.1 Soil Sampling

For specific soil sampling procedures associated with off-site disposal, material reuse, or import source evaluation, refer to the EWP (Appendix C of the SMP).

The following general procedures should be conducted, as necessary:

- Characterize the sample according to the modified Burmister soil classification system.
- Field screen the sample for evidence of contamination (e.g., odors, staining, etc.) in accordance with Section 3.1.2 and EWP (Appendix C of the SMP).
- Collect soil samples as detailed in the EWP, place in laboratory-supplied glassware, and place in an ice-filled cooler for shipment to the laboratory.
- Complete the proper chain of custody paperwork and seal the cooler.
- Record sample location, sample depth, and sample observations (evidence of contamination, PID readings, soil classification, etc.) in field log book and boring log data sheet, if applicable.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.3 of this QAPP.

4.2 Groundwater Sampling

Groundwater sampling will be conducted according to the following procedures:

- Field screen the sample for evidence of contamination (e.g., odors, staining, etc.) using visual and olfactory methods and screen the well headspace for VOCs using a PID equipped with an 11.7 eV lamp.
- Collect the groundwater sample from each proposed sample location in laboratory-supplied glassware, label the sample in accordance with Section 4.4.1, and place in an ice-filled cooler for shipment to the laboratory.
- Complete the proper COC paperwork and seal the cooler.
- Record sample location, sample depth, and sample observations (evidence of contamination, PID readings, free phase liquid, etc.) in field log book and boring log data sheet, if applicable.
- Decontaminate any groundwater sampling equipment between sample locations as described in Section 3.1 of this QAPP.

4.3 Soil Vapor and Ambient Air Sampling

Soil vapor and ambient air sampling, if required, will be conducted according to the following procedures:

- Field screen the sample for evidence of contamination (e.g., odors, etc.) using olfactory methods and screen the purged vapors for VOCs using a PID equipped with an 11.7 eV lamp.
- Collect the soil vapor/ambient air samples from each proposed sample locations in laboratory-supplied SUMMA® canisters, label the sample in accordance with Section 4.4.1, and place in shipment container for shipment to the laboratory.
- Complete the proper COC paperwork and seal the shipment container.
- Record sample location, sample depth, and sample observations (odors, PID readings, etc.) in field log book and boring log data sheet, if applicable.

4.4 Laboratory Methods

Table 1 summarizes the laboratory methods that will be used to analyze field samples and the sample container type, preservation, and applicable holding times. An Environmental Laboratory Approval Program (ELAP)-certified laboratory will be used for all chemical analyses in accordance with DER-10 2.1(b) and 2.1(f), including Category B Deliverables.

Table 1
Laboratory Analytical Methods for Analysis Groups

Matrix	Analysis	EPA Method	Bottle Type	Preservative	Hold Time
Soil and Soil QA/QC	Volatile Organic Compounds (VOCs)	8260C	EnCore samplers (3) and 2 oz. plastic jar	≤ 6 ºC	48 hours to extract; 14 days to analyze
	Semivolatile Organic Compounds (SVOCs)	8270D	8 oz. Glass Jar	≤ 6 ºC	14 days to extract; 40 days to analyze
	Total Analyte List (TAL) Metals, and Hexavalent Chromium	6000/7000 Series, 6010C, and 7196A	8 oz. Glass Jar	≤ 6 ºC	6 months holding time; Mercury 28 days holding time; Hexavalent chromium 30 days to extract, 7 days to analyze
	Pesticides	8081B	8 oz. Glass Jar	≤ 6 ºC	14 days to extract; 40 days to analyze
	Polychlorinated Biphenyls (PCBs)	8082A	8 oz. Glass Jar	≤ 6 ºC	14 days to extract; 40 days to analyze
Groundwater and Groundwater QA/QC	VOCs	8260C	40 mL Glass Vials (3)	HCl to pH < 2 and ≤ 6 ºC	48 hours to extract; 14 days to analyze
	SVOCs	8270D	2,000 mL Amber Jar	≤ 6 ºC	7 days to extract; 40 days to analyze
	TAL Metals	6000/7000 Series	2,000 mL Amber Jar	HNO_3 to pH < 2	6 months for metals; 28 days for mercury; 24 hours for hexavalent chromium
	Pesticides	8081B	2,000 mL Amber Jar	≤ 6 ºC	7 days to extract; 40 days to analyze
	PCBs	8082A	2,000 mL Amber Jar	≤ 6 ºC	7 days to extract; 40 days to analyze
Soil Vapor and Ambient Air	VOCs	TO-15	6L SUMMA® Canister	None	14 days

Notes:
QA/QC samples will be analyzed for the same parameters as the parent sample, with the exception of the trip blank(s), which will be analyzed for VOCs by EPA Method 8260C only.
EPA - Environmental Protection Agency
Hg – Mercury
RCRA – Resource Conservation and Recovery Act

4.5 Quality Control (QC) Sampling

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

4.6 Sample Handling

4.6.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody (COC) documents, and laboratory reports. Soil, groundwater, soil vapor, and ambient air samples will be identified "SB-" for soil borings, "MW-" for groundwater monitoring wells, "SV-" for soil vapor points, and "AA-" for ambient air samples, and the soil boring, groundwater monitoring well number, soil vapor point, or ambient air sample number. All samples will be amended with the collection date at the end of the sample same in a year, month, day (YYYYMMDD) format. Blind duplicate sample nomenclature will consist of the sample type, followed by an "X"; MS/MSD samples nomenclature will consist of the parent sample name, followed by "MS/MSD"; and trip and field blanks will consist of "TB-" and "FB-", respectively, followed by a sequential number of the trip/field blanks collected within the sample digestion group (SDG). Special characters, including primes/apostrophes ('), will not be used for sample nomenclature. Table 2 provides examples of the proposed identification scheme.

Table 2
Proposed Sample Nomenclature

Proposed Sample Description	Sample Designation
Groundwater sample collected from groundwater monitoring well MW-A on July 1, 2020	MW-A 20200701
Matrix spike/matrix spike duplicate sample of groundwater sample collected from groundwater monitoring well MW-A on July 1, 2020	MW-A MS/MSD 20200701
Blind duplicate sample of groundwater sample collected from groundwater monitoring well MW-A on July 1, 2020	MW-X 20200701
Second field blank collected on July 1, 2020	FB-02 20200701
Soil sample collected from soil boring SB-1 between 8 and 10 feet below grade on July 1, 2020	SB-1 (8-10) 20200701
Second blind duplicate soil sample of SDG collected from soil boring SB-10 between 8 and 10 feet below grade on July 1, 2020	SB-X02 (8-10) 20200701

Sample Labeling and Shipping

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

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

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. All samples will be shipped to the laboratory at least twice per week. At the start and end of each workday, field personnel will add ice to the cooler(s) as needed.

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

Sample Custody

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

4.7 Field Instrumentation

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

4.8 Quality Assurance (QA)

All soil, groundwater, and soil vapor laboratory analytical data will be reviewed by a third-party validator and a DUSR will be prepared to document the usability and validity of the data. The RIR will include a detailed description of endpoint sampling activities, data summary tables, concentration map showing sample locations and concentrations, DUSR, and laboratory reports.

ATTACHMENT A

RESUMES OF PROJECT QA/QC OFFICER, PROJECT DIRECTOR, PROJECT MANAGER, AND FIELD TEAM LEADER

MARC GODICK, LEP

SENIOR VICE PRESIDENT

Marc S. Godick, LEP is a Senior Vice President of the firm. He has broad-based environmental experience includes expertise in brownfield redevelopment, site assessment, remedial investigation, design and implementation of remedial measures, compliance assessment, and litigation support.

RELEVANT EXPERIENCE

QUEENS WEST PROJECT, AVALON BAY COMMUNITIES, QUEENS, NY

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

3200 JEROME AVENUE (FORMER PS 151), BRONX, NY

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

BACKGROUND

Education

ME, Pennsylvania State University, Engineering Science/Environmental Engineering, 1998

BS, Carnegie Mellon University, Chemical Engineering, 1989

Licenses/Certifications

Licensed Environmental Professional, CT - 396

OSHA 40 Hour HAZWOPER

OSHA 8 Hour Refresher

OSHA 8 Hour Supervisor

Professional Memberships

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

Chairman/Member, Westchester County Soil and Water Conservation District

Member, Westchester County Stormwater Advisory Board

Board of Directors, Sheldrake Environmental Center

Member, New York State Department of Environmental Conservation

Years of Experience

29 years in the industry

17 years with AKRF

ON-CALL ENVIRONMENTAL CONSULTING SERVICES (VARIOUS LOCATIONS), NEW YORK CITY MAYOR'S OFFICE OF ENVIRONMENTAL REMEDIATION (OER) (ADMINISTERED BY NYCEDC), VARIOUS LOCATIONS, NY

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

606 WEST 57TH STREET, TF CORNERSTONE, NEW YORK, NY

AKRF has been retained by TF Cornerstone to provide environmental services for the proposed redevelopment of a portion of the block bounded by Eleventh and Twelfth Avenues and West 56th and 57th Streets. The proposed actions included a zoning map amendment, zoning text amendments, a special permit, and an authorization to facilitate development of approximately 1.2 million square feet of residential and retail space. AKRF prepared an Environmental Impact Statement (EIS) for the New York City Department of City Planning (DCP) to analyze the effects of the proposed actions and development of the proposed building. The EIS addressed the full range of environmental impacts associated with the proposed development. Mr. Godick was responsible for the elements of the EIS pertaining to hazardous materials, including coordination of a Phase I ESA and summarizing pertinent site information for the hazardous materials and construction chapters. Mr. Godick provided pre-acquisition support to TF Cornerstone, which included development of a remedial cost estimate report to outline remediation cost during site development. Mr. Godick also managed work related to the subsurface investigation, localized remediation (chemical injection and limited excavation beneath the building basement) and regulatory closure of a petroleum spill on a portion of the project site to satisfy NYSDEC requirements. After EIS certification, Mr. Godick coordinated approvals with NYCOER, the regulatory agency overseeing remedial measures related to the redevelopment of the site. The Site has an (E) Designation and is participating in the New York City Voluntary Cleanup Program. Mr. Godick managed the preparation of a Phase II Investigation Work Plan, Remedial Investigation Report, Remedial Action Work Plan (RAWP), and contractor specifications for soil management and tank and hydraulic lift removal. Mr. Godick managed implementation of the remediation in accordance with the RAWP.

164 KENT AVENUE (AKA NORTHSIDE PIERS AND 1 NORTH 4TH PLACE), RD MANAGEMENT, L&M DEVELOPMENT, TOLL BROTHERS, AND DOUGLASTON DEVELOPMENT, BROOKLYN, NY

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

REBECCA KINAL, PE

ENVIRONMENTAL ENGINEER

Rebecca Kinal, PE has extensive experience in the assessment and remediation of soil and groundwater contamination and other hazardous/non-hazardous waste problems. Ms. Kinal's experience includes environmental due diligence, soil and groundwater investigations, leaking underground storage tank studies, soil gas/vapor intrusion surveys, and oversight of small- and large-scale remediation programs, including design of groundwater remediation systems and vapor mitigation systems. She has directed numerous Phase I and Phase II investigations and remediation programs, many of them in conjunction with commercial/residential developers, law firms, lending institutions, and public agencies. She is experienced in the cleanup of contaminated properties under New York State Brownfield Cleanup Program (BCP) regulations and the New York City "E-designation" program. As a part of this work, her duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

BACKGROUND

Education

MS, Rensselaer Polytechnic Institute, Hydrogeology, 1995

BS, Lafayette College, Civil Engineering, 1992

Licenses/Certifications

Professional Engineer, NY - 082046-1

OSHA 40 Hour HAZWOPER

OSHA 8 Hour Refresher

Years of Experience

23 years in the industry

19 years with AKRF

RELEVANT EXPERIENCE

AVALONBAY COMMUNITIES, INC., AVALON PHASE II - NEW ROCHELLE, NY

Environmental Engineer. Ms. Kinal oversaw environmental investigation and soil remediation during the construction of two luxury high-rise apartment buildings and an associated parking garage.

QUEENS WEST SITES 8 & 9, LONG ISLAND CITY, NY

Deputy Project Manager. For over 20 years, AKRF has played a key role in advancing the Queens West development, which is transforming an underused industrial waterfront property into one of largest and most vibrant mixed-use communities just across the East River from the United Nations. AKRF has prepared an EIS that examines issues pertaining to air quality, land use and community character, economic impacts, historic and archaeological resources, and infrastructure. As part of the project, AKRF also undertook the largest remediation venture completed to date under the Brownfields Cleanup Program (BCP). Ms. Kinal helped prepare the Remedial Work Plan (RWP) and oversaw the remediation of Parcel 9, a 1.8-acre former industrial site. Ms. Kinal also managed the preparation of a Final Engineering Report (FER) to document the clean-up activities. The NYSDEC issued a Certificate of Completion (COC) for the Parcel 9 site in December 2006. Ms. Kinal continues to oversee post-remediation monitoring and site management activities to ensure that the remedy remains in-place and effective.

STREET-WORKS DEVELOPMENT, HAMILTON GREEN (200 HAMILTON AVENUE), WHITE PLAINS, NY

Environmental Engineer. AKRF prepared the Environmental Impact Statement (EIS) under the New York State Environmental Quality Review Act (SEQRA) and is providing site planning and environmental services for the development of Hamilton Green—a new vibrant, mixed-use community in downtown White Plains, NY. Hamilton Green, a transit oriented development (TOD), has been designed as a bridge between the White Plains TransCenter and the downtown core. The project incorporates a unique, food-centric destination—an upscale Food + Craft Hall (42,000 sf), innovative and active open space totaling 57,000 sf (35 percent of the site), 900 dwelling units, and an additional 48,000 sf of street level retail. The City of White Plains adopted a SEQRA Findings Statement and adopted the proposed zoning for Hamilton Green in July, 2018. Ms. Kinal managed environmental due diligence and remediation planning for the project, which included Phase I and II environmental assessments, a petroleum Spill investigation, preparation of remediation cost estimates, and application to the NYSDEC BCP.

COUNTY OF WESTCHESTER, DAVIDS ISLAND, WESTCHESTER, NY

Environmental Engineer. Ms. Kinal managed the hazardous materials portion of the audit of this undeveloped island site, including a Phase I Environmental Site Assessment (ESA) and Subsurface (Phase II) Investigation in areas where environmental conditions were identified. Ms. Kinal estimated the volume of contaminated soil requiring remediation and prepared cost estimates for soil excavation and for transportation and disposal of contaminated soil and hazardous materials.

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY, MOTT HAVEN REMEDIATION, BRONX, NY

Project Manager. AKRF performed services that included the preparation of an in situ sampling plan and excavation plan for waste characterization and disposal; supervision of waste characterization sampling activities; development and implementation of a community air monitoring program during all remediation activities; and daily reporting to the NYC School Construction Authority. Ms. Kinal provided environmental consulting services to the selected environmental remediation contractor for this former manufactured gas plant in the Mott Haven neighborhood of the Bronx, which was remediated under the NYSDEC BCP.

MONTEFIORE MEDICAL CENTER, MONTEFIORE-SOUND SHORE HOSPITALS, VARIOUS LOCATIONS, NY

Project Manager. Ms. Kinal provides due diligence assistance to Montefiore Medical Center (MMC) for the ongoing expansion of their facilities, primarily in the Bronx and Westchester County. She conducts and manages environmental due diligence tasks related to their property transactions, including Phase I Environmental Site Assessments (ESAs), Phase II investigations, and geophysical surveys. She also assists MMC in making decisions with respect to environmental risk issues.

CREAMER ENVIRONMENTAL, INC., KEYSPAN HALESITE, HALESITE, NY

Project Manager. AKRF performed professional services for the remedial design and engineering work associated with remediation of National Grid's former manufactured gas plant (MGP) located in the Town of Huntington. The site is situated in a sensitive location along the waterfront, surround by commercial and residential properties, and half the property where the remediation was conducted is a steep slope. The remedy consisted of soil removal, oxygen injection, and non-aqueous phase liquid recovery. Ms. Kinal developed the remedial work plans, design/construction documents, and managed environmental oversight of the remedial work, including waste characterization and tracking, confirmatory endpoint sampling, air monitoring, and reporting to the NYSDEC. After the remediation work was completed, Ms. Kinal prepared appropriate close-out documentation in accordance with NYSDEC requirements.

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY ON-CALL CONTRACTS FOR ENVIRONMENTAL CONSULTING SERVICES, VARIOUS SITES, NY

Project Manager for AKRF's on-call hazardous materials consulting contract with the New York City School Construction Authority for over 8 years. For potential new school sites, assignments include initial due diligence, Phase I environmental site assessments, (ESAs) and subsurface investigation of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school, likely remediation requirements, and associated costs. For sites undergoing design and development, assignments include preparation of remediation plan, contract specifications, and design drawings. The work has also included conducting indoor air quality testing, vapor intrusion assessments, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills for existing schools. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours.

STEVEN SCHMID

ENVIRONMENTAL SCIENTIST

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

BACKGROUND

Education

BS, University of New Hampshire, Marine & Freshwater Biology, Minor: Environmental Conservation Studies, 2011

Licenses/Certifications

NYSDEC Erosion and Sediment Control Certificate

NYSDOL Asbestos Project Monitor, Air Technician and Inspector, 12-13059

OSHA 10 Hour Construction Safety & Health Course

OSHA 30 Hour Construction

OSHA 40 Hour HAZWOPER

OSHA 8 Hour Refresher

Years of Experience

8 years in the industry

7 years with AKRF

RELEVANT EXPERIENCE

AVALON BAY COMMUNITIES, INC., AVALON YONKERS PCE, YONKERS, NY

Environmental Scientist. AKRF performed professional services for the preparation and submission of a supplemental remedial investigation for the site, a NYSDEC Brownfield redevelopment project along Alexander Street. The investigation included soil, groundwater and vapor environmental sampling as well as direct correspondence with NYSDEC project management.

AVALON BAY COMMUNITIES, INC., AVALON YONKERS PCW, YONKERS, NY

Environmental Scientist. AKRF performed professional services for the preparation and submission of the Remedial Investigation Report (RIR), which included multiple phases of remedial investigation for the former research and development (R&D) site, a NYSDEC Brownfield redevelopment project along the Hudson River. The RIR included soil, groundwater and soil vapor environmental sampling as well as LNAPL and DNAPL source identification and evaluation. As part of the remedial investigation efforts, TarGOST drilling techniques (laser induced fluorescence) and modeling were utilized to determine the extent of LNAPL and DNAPL.

TFC WEST 57 GC LLC, THE MAX AT 606 WEST 57TH STREET, NEW YORK, NY

Environmental Scientist. AKRF has been retained by TF Cornerstone to provide environmental services for the redevelopment of a portion of the block bounded by Eleventh and Twelfth Avenues and West 56th and 57th Streets. AKRF prepared an Environmental Impact Statement (EIS) for the NYC Department of City Planning (DCP) to analyze the effects of the proposed actions and development of the proposed building. The EIS addressed the full range of environmental impacts associated with the proposed development. After completion of the EIS, the client enrolled in the NYC Voluntary Brownfield Cleanup Program to investigate and remediate the 83,260-square foot site for planned redevelopment. A remedial investigation was performed to compile and evaluate data and information necessary to develop a Remedial Action Work Plan (RAWP) pertaining to the planned development. AKRF performed oversight of the construction excavation activities to ensure compliance with the RAWP. Mr. Schmid conducted construction oversight and community air monitoring during the removal of contaminated soil.

NEW YORK CITY OFFICE OF ENVIRONMENTAL REMEDIATION, SECOND FARMS, BRONX, NY

Environmental Scientist. AKRF, Inc. was initially contracted by the New York City Office of Environmental Remediation (NYCOER) to conduct a subsurface investigation of a 1.12-acre parcel in the Bronx, New York under the United States Environmental Protection Agency (USEPA) Brownfield Assessment Grant program. The investigation included a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, indoor air and ambient air samples. AKRF continued working on the project for the developer by preparing a Remedial Action Plan and Environmental Assessment Statement. AKRF is in the midst of implementing the remedy. Mr. Schmid assisted in the investigation which included a geophysical survey and utility mark-outs, and the collection and analysis of soil, groundwater, soil vapor, indoor air and ambient air samples.

NEW YORK CITY HOUSING AUTHORITY, RANDOLPH HOUSES, NEW YORK, NY

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

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY (SCA), ENVIRONMENTAL CONSULTING HAZARDOUS MATERIALS SERVICES, VARIOUS LOCATIONS, NY

AKRF has undertaken various assignments under two consecutive hazardous materials on-call contracts, including environmental assessment, remedial design, and plumbing disinfection consulting tasks. For potential new school sites, assignments include initial due diligence, Phase I environmental site assessments (ESAs) and multi-media subsurface investigation of soil, groundwater, and soil vapor to determine the suitability of a site for development as a school, likely remediation requirements, and associated costs. For sites undergoing design and development, assignments include preparation of remediation plans, design of sub-slab depressurization systems (SSDS) and contract specifications, and construction oversight. The work has also included conducting Phase I ESAs and indoor air quality testing, preparation of specifications, supervision of storage tank removals, and investigation and remediation of spills for existing schools. Due to the sensitivity of school sites, work under this contract is often conducted on short notice and during non-school hours. As the environmental scientist Mr. Schmid has provided oversight during plumbing disinfections, storage tank removals and spill remediation.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION, WILLETS POINT DEMOLITION, QUEENS, NY

Environmental Scientist. AKRF supported the New York City Economic Development Corporation (EDC) with Phase 1 of the Willets Point Redevelopment Plan, which includes the demolition of existing structures. AKRF also supported EDC with review of contractor notifications, submittals and air monitoring during abatement.

PATRICK MCHUGH, PE

TECHNICAL DIRECTOR

Patrick McHugh, PE is a Senior Professional with experience in assessment, investigation, and remediation of environmental contamination-related issues. Mr. McHugh also has experience in petroleum engineering associated with exploration of oil and gas aquifers.

Mr. McHugh has managed a variety of environmental projects with multi-disciplinary teams, including public agencies, developers, property owners, architects, and construction managers. His projects have fallen under the regulatory oversight of the United States Environmental Protection Agency and New York State Department of Environmental Conservation, including the New York State Brownfield Cleanup Program (BCP) and New York petroleum spills program, as well as multiple agencies in the Midwest. His proficiency in all aspects of remedial design—supplemented by his field-experience, his knowledge of regulations and regulatory programs, and his excellent rapport with regulatory personnel—allows him to lead field efforts toward remediation and development, and to achieve project objectives effectively.

Mr. McHugh's experience includes the design, implementation, and management of environmental assessment, investigation and remediation projects in the New York Metropolitan Area and the Minneapolis, Minnesota Metropolitan Area, including soil and groundwater investigation, monitoring, and sampling programs; Brownfield and hazardous waste site investigations; and underground storage tank studies, which involved soil contamination delineation, classification, and waste removal and disposal. Mr. McHugh has also led remediation design efforts, including in-situ chemical oxidation, in-situ soil stabilization, soil vapor extraction systems, and pump and treat groundwater systems. In addition, Mr. McHugh has designed and implemented indoor air and soil vapor intrusion surveys at industrial, commercial, and residential properties in accordance with New York State Department of Health protocols, some requiring sub-slab depressurization systems.

BACKGROUND

Education

MS, Duke University, Engineering Management, 2012

BS, University of Notre Dame, Civil Engineering, 2010

Licenses/Certifications

Professional Engineer, NY - 098204

Health and Safety Operations at Hazardous Materials Sites, 29 CFR 1910.120

OSHA 40 Hour HAZWOPER

OSHA 8 Hour Refresher

Years of Experience

7 years in the industry

2 years with AKRF

RELEVANT EXPERIENCE

AVALON 114-120 PARKWAY ROAD, AVALON BAY COMMUNITIES, INC., BRONXVILLE, NY

Project Manager. Mr. McHugh was responsible for oversight and environmental work required in for demolition, abatement and tank removal of an out of service gas station. Mr. McHugh will be responsible for completion of specifications, selection of the contractor(s) and overall coordination with the Client. Through the work, Mr. McHugh will manage the field staff and complete the required reporting required by NYSDEC, which will include a spill closure report in addition to other closure reports and permits required by the county and city municipal branches.

AVALON YONKERS, AVALON BAY COMMUNITIES, INC, YONKERS, NY

Project Manager. Mr. McHugh was responsible for implementation of the Site Management Plan (SMP) at the Former Halstead Quinn/ATI Tank Farm Site, a NYSDEC Brownfield redevelopment project along the Hudson River. As part of redevelopment efforts, Mr. McHugh was responsible for design and completion of an active sub-slab depressurization system, groundwater treatment (dewatering) system design and slurry wall. Mr. McHugh leads direct communication with NYSDEC regarding redevelopment activities at the site, including the remedial design components in addition to the shoreline stabilization measures (bulkhead and rip-rap design). Further, Mr. McHugh is responsible for the environmental reporting required with close out of the remedial work.

AVALON YONKERS PCW, AVALON BAY COMMUNITIES, INC, YONKERS, NY

Project Manager. AKRF performed professional services for the preparation and submission of the Remedial Investigation Report (RIR), which included multiple phases of remedial investigation for the former research and development (R&D) site, a NYSDEC Brownfield redevelopment project. The RIR included soil, groundwater and soil vapor environmental sampling as well as LNAPL and DNAPL source identification and evaluation. As part of the remedial investigation efforts, TarGOST drilling techniques (laser induced fluorescence) and modeling were utilized to determine the extent of LNAPL and DNAPL. Mr. McHugh was responsible for the preparation and NYSDEC submission of the Remedial Action Work Plan (RAWP) for the proposed hot spot excavation, LNAPL collection, in-situ soil stabilization (ISS), soil management, groundwater treatment, dewatering, shoreline permitting, groundwater discharge permitting, building abatement and demolition, site-wide engineered cover systems with a vapor management system (VMS) and stormwater management system. Mr. McHugh currently serves as the project manager for oversight of the remedial work, which has been ongoing since early 2018. During remedial work, additional design components have been required (e.g. shoreline slurry wall, pile plugs, enhanced bioremediation and stormwater utility line anti-seep collars) by NYSDEC of which Mr. McHugh has held the responsibility of design and implementation. Mr. McHugh will also lead the reporting eftorts required post remediation.

AVALON YONKERS PCE, AVALON BAY COMMUNITIES, INC, YONKERS, NY

Project Manager. AKRF performed professional services for the preparation and submission of a supplemental remedial investigation for the site, a NYSDEC Brownfield redevelopment project along Alexander Street. The investigation included soil, groundwater and vapor environmental sampling as well as direct correspondence with NYSDEC project management. Mr. McHugh was responsible for the preparation and negotiations with NYSDEC and for the concepts of the RAWP, which included hot spot excavations, UST removal, groundwater treatment, dewatering, building abatement and demolition, ISS, site-wide engineered cover systems with a VMS and stormwater management system. Mr. McHugh serves as the project manager for oversight of the pre-construction and remedial work. Mr. McHugh will also lead the reporting eftorts required post remediation.

PHIPPS HOUSES, ATLANTIC CHESTNUT AFFORDABLE HOUSING, ATLANTIC CHESTNUT LOTS 1, 2 & 3, BROOKLYN, NY

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

APPENDIX G

SITE MANAGEMENT FORMS

SITE MANAGEMENT FORM – SITE-WIDE INSPECTION
POLYCHROME EAST SITE (C360098)
80-94 ALEXANDER STREET, YONKERS, NEW YORK

Inspector:

Date:

1. Site Use Restrictions

No on-site vegetable gardens?

No groundwater withdrawal for potable/non-potable use?

Restricted residential use maintained?

2. Site Cap

Note the date that the annual site cap inspection was performed:

Repairs made as noted during inspection?

3. Soil Management

Note the date(s) of any soil disturbance activities conducted during the past year:

Proper soil management procedures implemented (cite appropriate close-out reports)?

4. Recordkeeping

Check that the following records/reports are being maintained/completed (note report/log dates as appropriate):

1) Annual site cap inspection log:
2) Close-out report(s) for soil disturbance activities (including manifests for soil disposal):

5. Comments

SITE MANAGEMENT FORM – WELL SAMPLING LOG
POLYCHROME EAST SITE (C360098)
80-94 ALEXANDER STREET, YONKERS, NEW YORK

Well Sampling Log

AKRF

Job No: 180017	**Client:** Avalon Yonkers Sun Sites, LLC	**Well No:**
Project Location: 137-145 Alexander Street, Yonkers, NY	**Sampled By:**	
Date:	**Sampling Time:**	
LEL at surface:		
PID at surface:		
Total Depth: ft. below top of casing	**Water Column (WC):** feet	*= 0.163 * WC for 2" wells
Depth to Water: ft. below top of casing	**Well Volume*:** gallons	*= 0.653 * WC for 4" wells
Depth to Product: ft. below top of casing	**Volume Purged:** gallons	*= 1.469 * WC for 6" wells
Depth to top of screen: ft. below top of casing	**Well Diam.:** inches	Target maximum flow rate is 100 ml/min
Depth to bottom of screen: ft. below top of casing	**Purging Device (pump type):**	
Approx. Pump Intake: ft. below top of casing		

Time	**Depth to Water** (Ft.)	**Purge Rate** (ml/min)	**Temp** (°C)	**Conductivity** (mS/cm)	**DO** (mg/L)	**pH**	**ORP** (mV)	**Turbidity** (NTU)	**Comments** (problems, odor, sheen)
Stabilization Criteria:				**+/- 3 mS/cm**	**+/- 0.3 mg/L**	**+/- 0.1 pH units**	**+/- 10 mV**	**<50 NTU**	If water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, discontinue purging and collect sample.

Groundwater samples analyzed for:

SITE MANAGEMENT FORM – NAPL GAUGING SHEET
POLYCHROME EAST SITE (C360098)
80-94 ALEXANDER STREET, YONKERS, NEW YORK

AKRF

NAPL Gauging Sheet

NAPL Recovery Well	Date	Time (EST)	Depth to LNAPL (Ft.)	Depth to Water (Ft.)	Depth to DNAPL (Ft.)	Total Depth (Ft.)	LNAPL Thickness (Ft.)	DNAPL Thickness (Ft.)	Comments (problems, odor, sheen)

SITE MANAGEMENT FORM - SSDS MAINTENANCE LOG
POLYCHROME EAST SITE (C360098)
80-94 Alexander Street, Yonkers, NY

Date	Time	Location	Reason for maintenance	Error message	Restart successful?	Description of persistant problem(s)	Modification to system?	Photograph or sketch of problem/modification

SITE MANAGEMENT FORM - ROUTINE SYSTEM MONITORING INSPECTION FORM
POLYCHROME EAST SITE (C360098)
80-94 Alexander Street, Yonkers, NY

Inspector Name:		**Date:**	
Time In:		**Time Out:**	

General

Is the blower running? yes or no (*circle one*)
If blower is off, immediately notify an emergency contact.

Are gauges and exterior of SSDS control panel clean? yes or no *(circle one)*

Are there any unusual odors, spills or leaks near the system? yes or no (*circle one*)
If yes, decribe suspected source and notify emergency contact.

Is air discharging from the exhaust piping to the roof?

Are there any problems with the exhaust piping? yes or no (circle one)
If yes, describe location of problem and notify emergency contact.

SSDS Operations

Riser Pipe	Flow Rate in Accepted Range? [1,2] (40 to 100 cfm)	Applied Vacuum In Accepted Range? [1,2] (0.5 to 10 in. H_2O)
R-1	☐ YES ☐ NO	☐ YES ☐ NO
R-2	☐ YES ☐ NO	☐ YES ☐ NO
R-3	☐ YES ☐ NO	☐ YES ☐ NO
R-4	☐ YES ☐ NO	☐ YES ☐ NO
R-5	☐ YES ☐ NO	☐ YES ☐ NO
R-6	☐ YES ☐ NO	☐ YES ☐ NO
R-7	☐ YES ☐ NO	☐ YES ☐ NO

Comments:

Notes:
1. Normal system flow rates range from 40 to 100 cfm. Applied vacuum readings range from 0.5 to 10 in. H_2O. System readings will be obtained from each riser leg (R-1 through R-7).
2. If readings are outside of the ranges indicated, inform emergency contacts below.

in. of H_2O - inches of water
cfm - cubic feet per minute

Emergency Contact Information

Name	Title	Contact Numbers
Patrick McHugh	AKRF - PE/QEP	914-922-2387 (office)
Christopher Capece	Avalon Bay - Site Owner Representative	516-501-6004 (office)
Matthew Hubicki	NYSDEC - Project Manager	518-402-9605 (office)

Revised 12/2014

SITE MANAGEMENT FORM - DETAILED SYSTEM MONITORING INSPECTION FORM
POLYCHROME EAST SITE (C360098)
80-94 Alexander Street, Yonkers, NY

Inspector Name:		**Date:**	
Time In:		**Time Out:**	
General			
Weather:	Temperature:	Barometric Pressure:	
When was the last rain event?			
Is the blower currently operating? Yes / No (circle one) If no, please list reason/alarm condition:			
Any evidence of system tampering, vandalism or damage in the first floor equipment room? Any evidence of system tampering, vandalism, or damage to the exhaust stack?			
Were all cleanout/sampling port caps securely attached prior to system testing? If no, list location and contact Project Manager/Project Director.			
Is the concrete floor slab overlying all of the SSDS piping runs intact? If no, list location and contact Project Manager/Project Director.			

SSDS Operations

Sample Identification	Sample Location	Flow Rate[1] cfm	Applied Vacuum[1] in. H_2O	Induced Vacuum[2] in. H_2O	Notes
MP-1	Electrical Room	NA	NA		
MP-2	Mechanical Room	NA	NA		
MP-3	Corridor	NA	NA		
MP-4	Corridor	NA	NA		
R-1	See Appendix E			NA	
R-2	See Appendix E			NA	
R-3	See Appendix E			NA	
R-4	See Appendix E			NA	
R-5	See Appendix E			NA	
R-6	See Appendix E			NA	
R-7	See Appendix E			NA	

Comments:

Notes:

1. Normal system flow rates range from 40 to 100 cfm. Applied vacuum readings range from 0.5 to 10 in. H_2O. System readings will be obtained from each riser leg (R-1 through R-7).
2. Normal system induced vacuum readings should be a minimum of 0.005 in. H_2O. System readings will be obtained from each monitoring point (MP-1 through MP-4).
3. If observations are confirmed to be outside of this range, inform emergency contacts below and prepare corrective action plan, if necessary.

in. of H_2O - inches of water

cfm - cubic feet per minute

NA - not applicable

Emergency Contact Information

Name	Title	Contact Numbers
Patrick McHugh	AKRF - PE/QEP	914-922-2387 (office)
Christopher Capece	Avalon Bay - Site Owner Representative	516-501-6004 (office)
Matthew Hubicki	NYSDEC - Project Manager	518-402-9605 (office)

APPENDIX H

NAPL RECOVERY AND GROUNDWATER MONITORING WELL CONSTRUCTION LOGS

AKRF

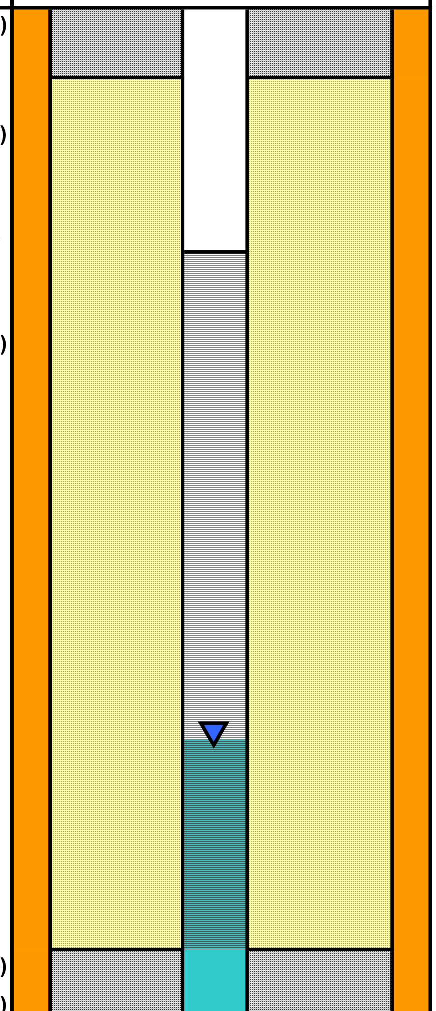
Monitoring/LNAPL Well Construction Log

Well No.			
MW-A	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 1**
	Location: AVB Yonkers - PCE	**Weather:** 35°F, Overcast	**Drilling**
	Drilling Method: Direct Push Probe	**Driller:** EES	**Start** / **Finish**
	Depth to Water: 10.65 ft	**Logged By:** J. Sulich	**Date** 2/18/2019 / **Date** 2/18/2019
			Time 8:10 / **Time** 9:55

Surface Conditions: SOIL

Depth (feet)	Well Construction Description	Well Construction
0–1	**Bentonite Seal (0-1')**	
	4" Diameter PVC Riser (0-3.5')	
	Sand Filter Pack/Gravel (1'-13.5')	
	4" Diameter 20-Slot PVC Well Screen (3.5'-13.5')	
13.5–14.5	**Bentonite Seal (13.5-14.5')**	
	4" Diameter PVC Sump (13.5'-14.5')	
15	**End of boring at approximately 14.5 feet below grade.**	

Depth (feet): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20



Notes:

End of boring at approximately 14.5 feet below grade.

The well was finished flush to grade with a J-plug and steel casting.

Groundwater encountered at approximately 10.65 feet below below grade during gauging on September 26, 2019.

NAPL was not detected using an oil/water interface probe during gauging on September 26, 2019.

AKRF

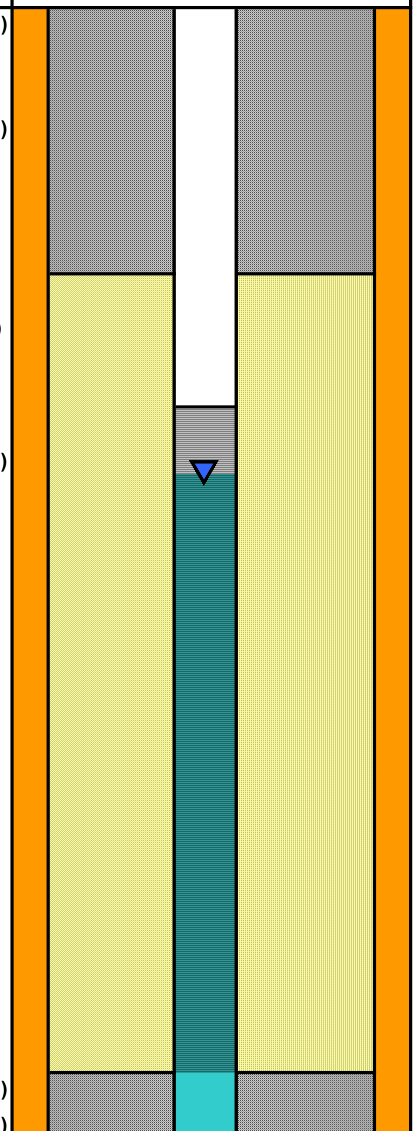
Monitoring/LNAPL Well Construction Log

Well No.			Sheet 1 of 1	
MW-B	**Job Number:** 180132	**Client:** Avalon Bay		
	Location: AVB Yonkers - PCE	**Weather:** 80°F, Overcast	**Drilling**	
	Drilling Method: Sonic	**Driller:** ADT	**Start**	**Finish**
	Depth to Water: 7.20 ft	**Logged By:** J. Sulich	**Date** 8/16/2019	**Date** 8/16/2019
			Time 12:55	**Time** 14:05

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
0–1	Bentonite Seal (0-4')
1–2	4" Diameter PVC Riser (0-6')
2–3	
3–4	
4–5	Sand Filter Pack/Gravel (4'-16')
5–6	
6–7	4" Diameter 20-Slot PVC Well Screen (6'-16')
7–8	
8–9	
9–10	
10–11	
11–12	
12–13	
13–14	
14–15	
15–16	
16–17	Bentonite Seal (16-17') 4" Diameter PVC Sump (16'-17')
17–18	End of boring at approximately 17 feet below grade.
18–19	
19–20	

Well Construction



Notes:

End of boring at approximately 17 feet below grade.

The well was finished with a protective stick-up casing to approximately 2 feet above grade. *

Groundwater encountered at approximately 9.20 feet below the stick-up casing (7.20 feet below grade) during gauging on November 13, 2019. **

NAPL was not detected using an oil/water interface probe during gauging on November 13, 2019.

* = Stick-up casing is estimated to extend approximately 2 feet above grade.

** = Depth to water from grade is estimated based on the estimated stick-up casing height.

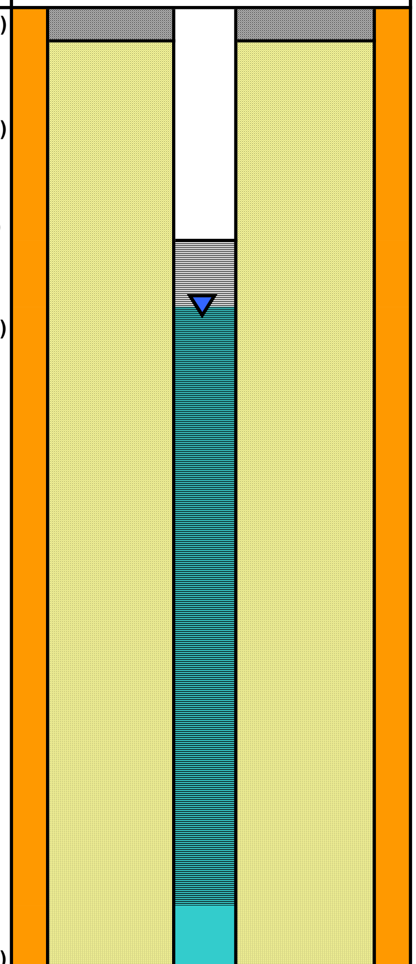
Monitoring/LNAPL Well Construction Log

Well No.			
MW-C	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 1**
	Location: AVB Yonkers - PCE	**Weather:** 60°F, Overcast	**Drilling**
	Drilling Method: Hollow Stem Auger	**Driller:** EES	**Start** / **Finish**
	Depth to Water: 4.72 ft **	**Logged By:** M. Candelario	**Date** 5/28/2019 / **Date** 5/28/2019
			Time 10:25 / **Time** 10:58

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
	Bentonite Seal (0-0.5')
1	
2	**4" Diameter PVC Riser (0-3.5')**
3	
4	**Sand Filter Pack (0.5'-14.5')**
5	**4" Diameter 20-Slot PVC Well Screen (3.5'-13.5')**
6	
7	
8	
9	
10	
11	
12	
13	
14	
	4" Diameter PVC Sump (13.5'-14.5')
15	**End of boring at approximately 14.5 feet below grade.**
16	
17	
18	
19	
20	

Well Construction



Notes:

End of boring at approximately 14.5 feet below grade.

The well was finished with a protective stick-up casing to approximately 2 feet above grade. *

Groundwater encountered at approximately 6.72 feet below the stick-up casing (4.72 feet below grade) during gauging on November 13, 2019. **

NAPL was not detected using an oil/water interface probe during gauging on November 13, 2019.

*** = Stick-up casing is estimated to extend approximately 2 feet above grade.**

**** = Depth to water from grade is estimated based on the estimated stick-up casing height.**

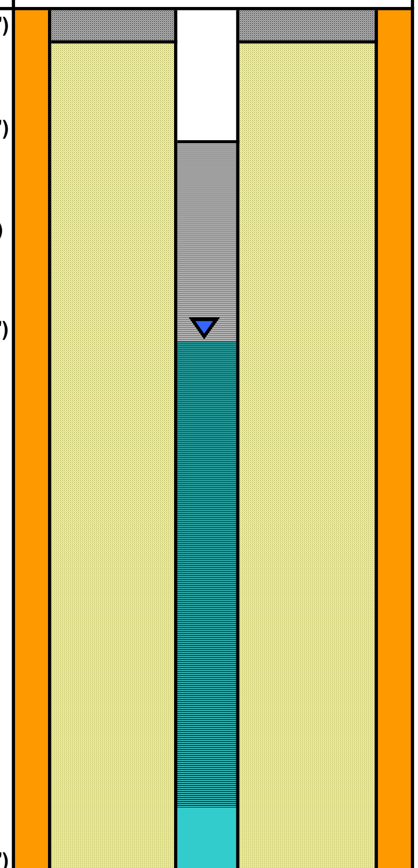
Monitoring/LNAPL Well Construction Log

Well No.			
MW-D	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 1**
	Location: AVB Yonkers - PCE	**Weather:** 60°F overcast	**Drilling**
	Drilling Method: Direct Push Probe	**Driller:** EES	**Start:** Date 5/28/2019, Time 8:00
	Depth to Water: 5.51 ft **	**Logged By:** J. Sulich	**Finish:** Date 5/28/2019, Time 8:30

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
0–1	Bentonite Seal (0-0.5')
2	4" Diameter PVC Riser (0-2')
3–4	Sand Filter Pack (0.5'-13')
5	4" Diameter 20-Slot PVC Well Screen (2'-12')
6	
7	
8	
9	
10	
11	
12	
13	4" Diameter PVC Sump (12'-13')
14	End of boring at approximately 13 feet below grade.
15	
16	
17	
18	
19	
20	

Well Construction



Notes:

End of boring at approximately 13 feet below grade.

The well was finished with a protective stick-up casing to approximately 2 feet above grade. *

Groundwater encountered at approximately 7.51 feet below the stick-up casing (5.51 feet below grade) during gauging on November 13, 2019. **

NAPL was not detected using an oil/water interface probe during gauging on November 13, 2019.

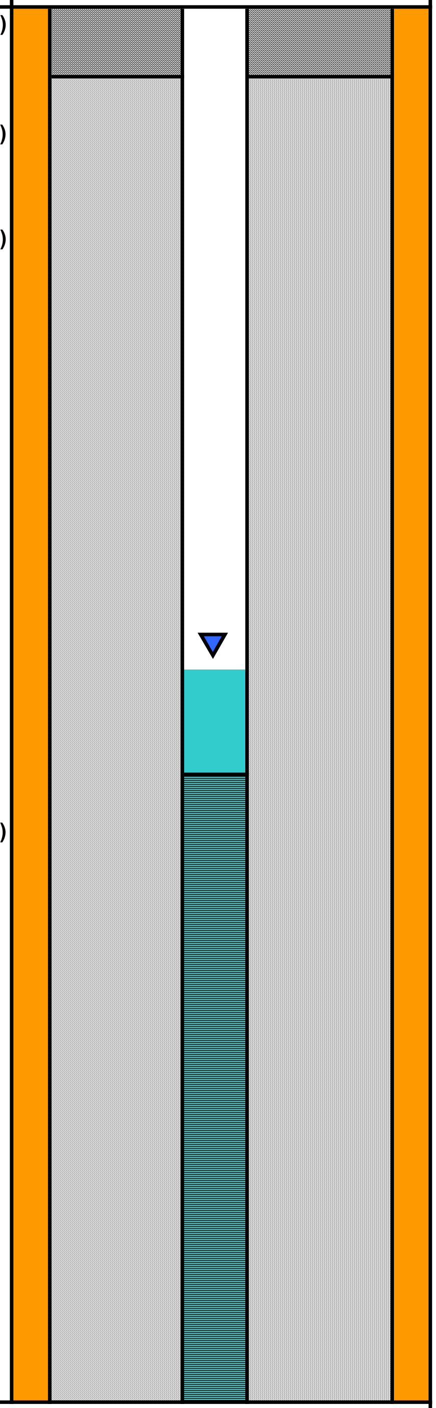
* = Stick-up casing is estimated to extend approximately 2 feet above grade.

** = Depth to water from grade is estimated based on the estimated stick-up casing height.

DNAPL Well Construction Log

Well No.			
NW-1	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 2**
	Location: AVB Yonkers - PCE	**Weather:** 30°F, Overcast	**Drilling**
	Drilling Method: Hollow Stem Auger	**Driller:** EES	**Start** / **Finish**
	Depth to Water: 9.21 ft	**Logged By:** J. Sulich	**Date** 2/20/2019 / **Date** 2/20/2019
			Time 11:00 / **Time** 15:00

Surface Conditions: SOIL

Depth (feet)	Well Construction Description	Well Construction
1	Bentonite Seal (0-1')	
2	4" Diameter PVC Riser (0-11')	
3		
4	Pea Gravel (1'-27')	
5		
6		
7		
8		
9		
10		
11		
12	4" Diameter 40-Slot PVC Well Screen (11'-26')	
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

End of boring at approximately 29 feet below grade.

The well was finished flush to grade with a J-plug and steel casting.

Groundwater encountered at approximately 9.21 feet below grade during gauging on June 24, 2019.

NAPL was not detected using an oil/water interface probe during gauging on June 24, 2019.

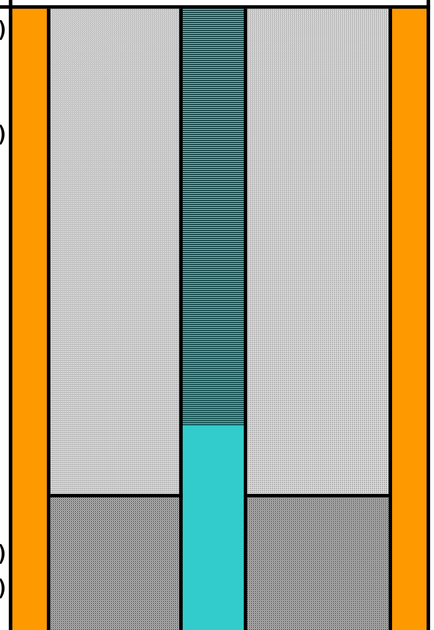
DNAPL Well Construction Log

Well No.	Job Number: 180132	Client: Avalon Bay	Sheet 2 of 2	
NW-1	Location: AVB Yonkers - PCE	Weather: 30°F overcast	Drilling	
	Drilling Method: Hollow Stem Auger	Driller: EES	Start	Finish
	Depth to Water: 9.21 ft	Logged By: J. Sulich	Date 2/20/2019	Date 2/20/2019
			Time 11:00	Time 15:00

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
21	Pea Gravel (1'-27')
22	4" Diameter 40-Slot PVC Well Screen (22.5'-30')
23	
24	
25	
26	
27	
28	4" Diameter PVC Sump (26'-29')
29	Bentonite Seal (27'-29')
30	End of boring at approximately 29 feet below grade.
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	

Well Construction



Notes:

End of boring at approximately 29 feet below grade.

The well was finished flush to grade with a J-plug and steel casting.

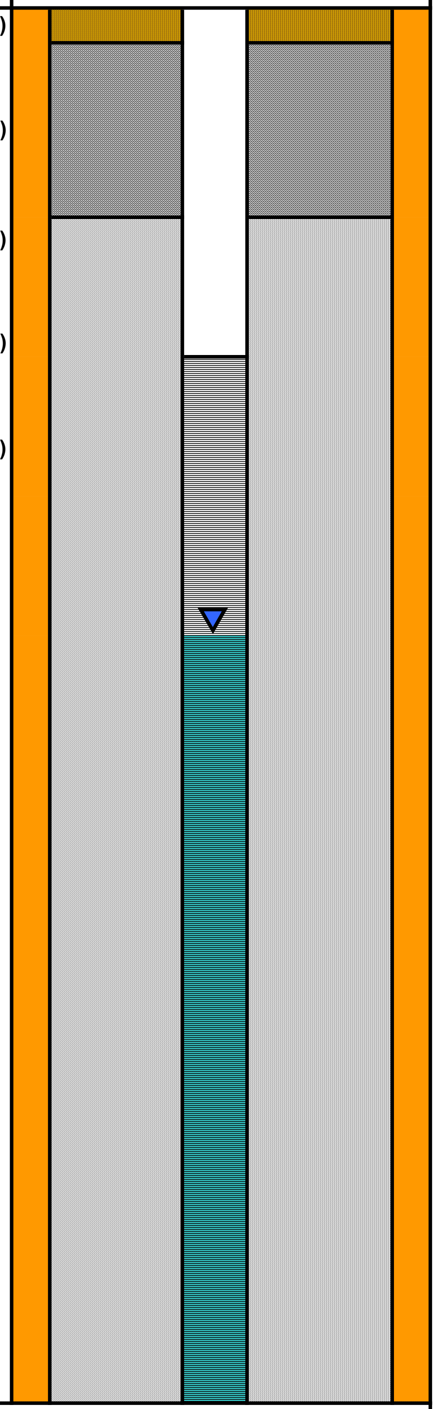
Groundwater encountered at approximately 9.21 feet below grade during gauging on June 24, 2019.

NAPL was not detected using an oil/water interface probe during gauging on June 24, 2019.

DNAPL Well Construction Log

Well No.				
NW-2	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 2**	
	Location: AVB Yonkers - PCE	**Weather:** 40°F sunny	**Drilling**	
	Drilling Method: Hollow Stem Auger	**Driller:** EES	**Start**	**Finish**
	Depth to Water: 9.05 ft	**Logged By:** J. Sulich	**Date** 3/19/2019	**Date** 3/19/2019
			Time 8:30	**Time** 10:45

Depth (feet)	Surface Conditions: SOIL Well Construction Description	Well Construction
1	**Traprock Screenings and Gravel (0-0.5')**	
2	**Bentonite Seal (0.5-3')**	
3		
4	**4" Diameter PVC Riser (0-5')**	
5	**Pea Gravel (3'-20')**	
6		
7	**4" Diameter 40-Slot PVC Well Screen (5'-20')**	
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		



Notes:

End of boring at approximately 23 feet below grade.

The well was finished flush to grade with a J-plug and steel casting.

Groundwater encountered at approximately 9.05 feet below grade during gauging on June 24, 2019.

NAPL was not detected using an oil/water interface probe during gauging on June 24, 2019.

DNAPL Well Construction Log

Well No.			
NW-2	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 2 of 2**
	Location: AVB Yonkers - PCE	**Weather:** 40°F sunny	**Drilling**
	Drilling Method: Hollow Stem Auger	**Driller:** EES	**Start** / **Finish**
	Depth to Water: 9.05 ft	**Logged By:** J. Sulich	**Date** 3/19/2019 / **Date** 3/19/2019
			Time 8:30 / **Time** 10:45

Surface Conditions: SOIL

Depth (feet)	Well Construction Description	Well Construction
21	Bentonite Seal (20'-23')	
22	4" Diameter PVC Sump (20'-23')	
23		
24	End of boring at approximately 23 feet below grade.	
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		

Notes:

End of boring at approximately 23 feet below grade.

The well was finished flush to grade with a J-plug and steel casting.

Groundwater encountered at approximately 9.05 feet below grade during gauging on June 24, 2019.

NAPL was not detected using an oil/water interface probe during gauging on June 24, 2019.

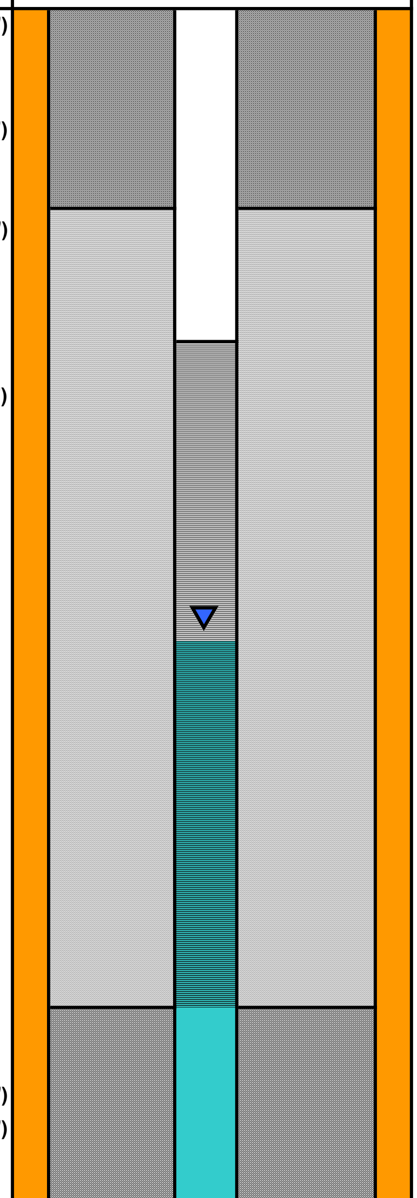
DNAPL Well Construction Log

Well No.			
NW-3	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 1**
	Location: AVB Yonkers - PCE	**Weather:** 80°F, Overcast	**Drilling**
	Drilling Method: Sonic	**Driller:** ADT	**Start** / **Finish**
	Depth to Water: 6.35 ft **	**Logged By:** J. Sulich	**Date** 8/15/2019 / **Date** 8/15/2019
			Time 12:45 / **Time** 14:35

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
1	**Bentonite Seal (0-3')**
2	**4" Diameter Stainless Steel Riser (0-5')**
3	
4	**Pea Gravel (3'-15')**
5	
6	**4" Diameter 40-Slot Stainless Steel Well Screen (5'-15')**
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	**Bentonite Seal (15'-18')** **4" Diameter PVC Sump (15'-18')**
18	
19	**End of boring at approximately 18 feet below grade.**
20	

Well Construction



Notes:

End of boring at approximately 18 feet below grade.

The well was finished with a protective stick-up casing to approximately 2 feet above grade. *

Groundwater encountered at approximately 8.35 feet below the stick-up casing (6.35 feet below grade) during gauging on November 13, 2019. **

NAPL was detected at approximately 19.13 feet below the stick-up casing (17.13 feet below grade) using an oil/water interface probe during gauging on November 13, 2019. **

*** = Stick-up casing is estimated to extend approximately 2 feet above grade.**

**** = Depth to water/NAPL from grade is estimated based on the estimated stick-up casing height.**

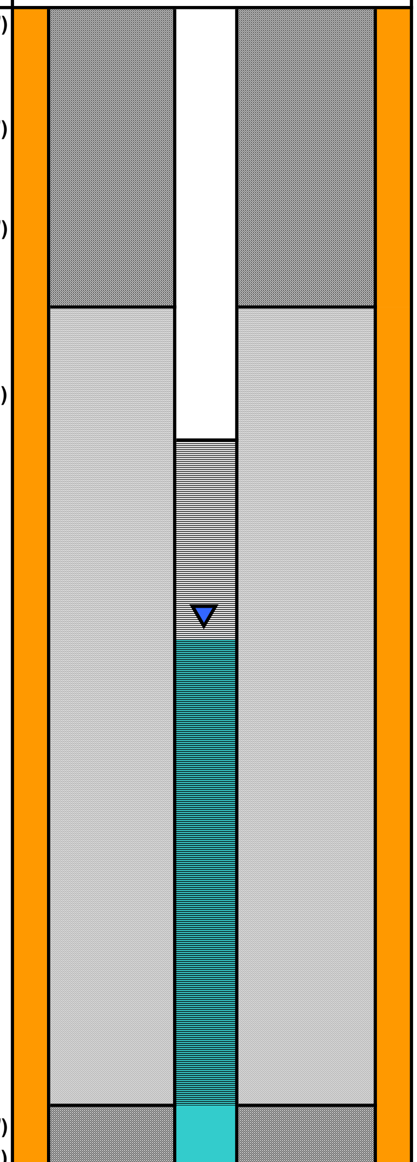
DNAPL Well Construction Log

Well No.			
NW-4	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 1**
	Location: AVB Yonkers - PCE	**Weather:** 80°F, Overcast	**Drilling**
	Drilling Method: Sonic	**Driller:** ADT	**Start** / **Finish**
	Depth to Water: 8.03 ft **	**Logged By:** J. Sulich	**Date** 8/15/2019 / **Date** 8/15/2019
			Time 11:00 / **Time** 12:00

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
0–1	**Bentonite Seal (0-4.5')**
2	**4" Diameter Stainless Steel Riser (0-6.5')**
3	
4	**Pea Gravel (4.5'-16.5')**
5	
6	**4" Diameter 40-Slot Stainless Steel Well Screen (6.5'-16.5')**
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	**Bentonite Seal (16.5'-17.5')**
	4" Diameter PVC Sump (16.5'-17.5')
18	**End of boring at approximately 17.5 feet below grade.**
19	
20	

Well Construction



Notes:

End of boring at approximately 17.5 feet below grade.

The well was finished with a protective stick-up casing to approximately 2 feet above grade. *

Groundwater encountered at approximately 10.03 feet below the stick-up casing (8.03 feet below grade) during gauging on November 13, 2019. **

NAPL was detected at approximately 14.68 feet below the stick-up casing (12.68 feet below grade) using an oil/water interface probe during gauging on November 13, 2019. **

*** = Stick-up casing is estimated to extend approximately 2 feet above grade.**

**** = Depth to water/NAPL from grade is estimated based on the estimated stick-up casing height.**

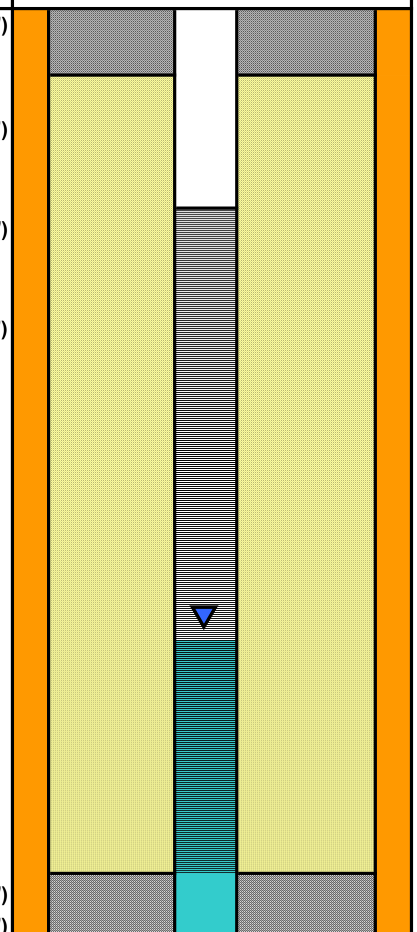
DNAPL Well Construction Log

Well No.			
NW-5	**Job Number:** 180132	**Client:** Avalon Bay	**Sheet 1 of 1**
	Location: AVB Yonkers - PCE	**Weather:** 80°F, Overcast	**Drilling**
	Drilling Method: Sonic	**Driller:** ADT	**Start** / **Finish**
	Depth to Water: 7.48 ft **	**Logged By:** J. Sulich	**Date** 8/15/2019 / **Date** 8/15/2019
			Time 8:45 / **Time** 10:15

Surface Conditions: SOIL

Depth (feet)	Well Construction Description
	Bentonite Seal (0-1')
1	
2	4" Diameter PVC Riser (0-3')
3	
4	Sand Filter Pack (1'-13')
5	4" Diameter 40-Slot PVC Well Screen (3'-13')
6	
7	
8	
9	
10	
11	
12	
13	
14	Bentonite Seal (13'-14') 4" Diameter PVC Sump (13'-14')
15	End of boring at approximately 14 feet below grade.
16	
17	
18	
19	
20	

Well Construction



Notes:

End of boring at approximately 14 feet below grade.

The well was finished with a protective stick-up casing to approximately 2 feet above grade. *

Groundwater encountered at approximately 9.48 feet below the stick-up casing (7.48 feet below grade) during gauging on November 13, 2019. **

NAPL was not detected using an oil/water interface probe during gauging on November 13, 2019.

* = Stick-up casing is estimated to extend approximately 2 feet above grade.

** = Depth to water/NAPL from grade is estimated based on the estimated stick-up casing height.

APPENDIX I

FIELD ACTIVITIES PLAN (STANDARD OPERATING PROCEDURES)

STANDARD OPERATING PROCEDURE FOR:

SOIL CLASSIFICATION AND LOGGING

SOP#: H-SI-02

March 2018

Prepared By:

Name: Axel Schwendt Signature: ______________ Date: 3-21-18

Prepared By:

Name: Asya Bychkov Signature: ______________ Date: 3-21-18

Approved By:

Name: Michelle Lapin Signature: ______________ Date: 3-21-18

Approved By:

Name: Marcus Simons Signature: ______________ Date: 3-21-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

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TABLES

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to classify soil during subsurface investigations, in accordance with the modified Burmister soil classification system. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

Soil classification systems are designed to standardize the categorization of soil based on observable characteristics, and are intended to limit the variability of soil characterizations by different field technicians. This SOP is intended for use during subsurface investigations (e.g., borings and test pits).

The modified Burmister soil classification system is commonly used to log soil. It includes descriptions of the type of soil by the approximate percentage of each component by dry weight, observations of fill material, and evidence of contamination. Other classification systems are used throughout the industry to complete geological or geotechnical soil logging, particularly the Unified Soil Classification System (USCS). The modified Burmister system should be used unless otherwise instructed by the Project Manager. The modified Burmister system was developed in 1950 and is based on grain size and plasticity, differing from the USCS in that it includes nomenclature to describe the soil's texture, color, mineralogy, and geological origin.

All activities will be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be utilized or cross-referenced during soil classification and logging, as applicable:

SOP #H-FW-01	Documentation
SOP #H-SI-01	Safety/Utility Clearance for Subsurface Investigation
SOP #H-SI-03	Soil Boring Oversight and Sampling
SOP #H-SI-04	Test Pit Oversight and Sampling

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- OSHA Level D PPE
- Nitrile Gloves
- Decontamination Supplies
- Photoionization Detector (PID) & Calibration Kit
- Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- Sampling Jars/Collection Equipment for Contingent Soil Sampling
- Permanent Marker and Field Book
- Respirator (in case upgrading to Level C PPE is required)

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Scope of Work (ex., Phase II Work Plan, RI Work Plan, or proposal)
- Soil Boring/Monitoring Well Logs from Previous Investigations, if applicable
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Boring and/or Monitoring Well Locations (if available, see Attachment A for a Figure Example)
- AKRF Soil Boring Logs and/or Test Pit Logs, to be completed during implementation of this SOP, as applicable. (See Attachment B for the Soil Boring Log Sheet Template and a completed example, and Attachment C for the Test Pit Log Sheet Template and a completed example.)
- Related SOPs Listed in Section 3.0

6.0 SOIL SCREENING PROCEDURES

Procedures for soil screening are described below:

1. Soil should be logged by distinct intervals within the soil core or test pit. The intervals will be classified and logged per Section 7.0. Each interval should consist of soil that is generally similar in composition, color, and absence or presence of contamination. For soil borings, note the overall thickness of the soil recovered in a soil core on the soil boring log, in inches. If more than one interval is present in a soil core, note each interval's approximate thickness in inches.
2. Visually inspect recovered soil; log its composition as detailed in Section 7.0.
3. Field-screen the soil using a PID calibrated with 100 parts per million (ppm) isobutylene calibration gas. Field screening can be performed by placing a small quantity of soil into a dedicated Ziploc bag and inserting the PID probe, or by opening a cavity in the soil core or soil recovered from a test pit and inserting the PID probe into the cavity. [Note: If inserting the PID probe into an open cavity, take care to ensure that the probe is not clogged with soil or exposed to excessive moisture or wet conditions, which will lead to malfunction of, or could damage, the PID.] For soil cores recovered from borings, take PID readings at several intervals (approximately every 6 inches to 1 foot) over the length of the core. For test pits, PID reading should be taken to represent the excavated soils (in most situations, PID reading should be taken every vertical foot). Note the PID readings in ppm on the appropriate log (either soil boring or test pit log); if no reading is detected, note "ND," not "0."
4. Note any odors, sheen, or staining present in the soil (and call your Project Manager if you see potential petroleum contamination).
5. If soil sampling is required, see SOP H-SI-03.
6. Representative photographs should be taken of the soil to display and help verify stratigraphy. For soil cores, line up in depth order; for test pits, its best to target the test pit side wall.

7.0 SOIL CLASSIFICATION METHODOLOGY

For the modified Burmister system, soil will be classified based on the following list of characteristics:

- Density and Consistency (if applicable)
- Color
- Grain Size

- Major Soil Type
- Minor Soil Constituents (or Type)
- Special Components

7.1 Density and Consistency

Density and Consistency is a determination based on the standard penetration resistance, or "blows per foot," recorded for a 24-inch drive of the drill probe. This characteristic can only be measured during split spoon sampling techniques, which involve using a "hammer" tool to advance the boring; the measurement cannot be conducted when using direct-push probe rigs. The measurement is recorded as the number of blows required to drive a standard 2-inch diameter split-spoon sampler 12 inches into the soil column. For this method, a hammer released under its own weight from a standard height of 30 inches is used. The number of blows required to penetrate each 6-inch interval of the 24-inch drive is measured. The total of the blow counts measured over the middle two 6-inch sections should be recorded on the soil boring log.

7.2 Color

Start by describing the color in simple terms (e.g., yellow, brown, black, gray, or red), or a combination of them (e.g., yellow-brown, or red-brown), or as shades (e.g., dark brown, or light gray). Colors should be described when soil is wetted, if possible.

7.3 Grain Size and Soil Types

Determine the grain size contained in each distinct interval of soil based on the following sizes listed in Table 1 below:

TABLE 1

GRAIN SIZE AND SOIL TYPE		
Grain Size Description	**Visual Description**	**Sieve Size**
Fines: Silt and Clay	Can't see individual particles (talcum powder)	<No. 200
Fine Sand	<1/64 inch (finest visible particles)	No. 200 to No. 40
Medium Sand	1/64 to 1/16 inch (granular sugar)	No. 40 to No. 10
Coarse Sand	1/16 to ¼ inch (rock salt)	No. 10 to No. 4
Fine Gravel	¼ to ¾ inch (pea to grape)	No. 4 to ¾ inch
Coarse Gravel	¾ to 3 inch (grape to baseball)	¾ to 3 inch
Cobbles	3 to 6 inch (baseball to large grapefruit	3 to 6 inch
Boulders	>6 inch	>6 inch

To help identify silt and clay, one of the following tests could be conducted in the field:

Dilatancy or Shaking Test: Silts are more permeable than clays and due to the chemical bonds, water within the pores of silt particles is more easily expelled. To conduct the test, mix a sample with water to a very soft consistency in the palm of the hand. Tap the back of the hand, or cup the hand slightly to squeeze the sample. If the soil is silty, water rises quickly to its surface and gives it a shiny or glistening appearance. Typically, the greater the proportion of clay in the sample, the slower the reaction of the water during the test.

Plasticity Test: The plasticity characteristic of clays can be used to determine the presence of clay. At a certain moisture content, soil that contains appreciable quantities of clay can be deformed and remolded in the hand without disintegration. Thus, if a sample of moist soil can be manipulated between the palms of the hands and fingers and rolled out into a long thread, it contains clay.

Other helpful tests, which may take more time, are:

Dry Strength Test: A portion of the sample is allowed to dry out and a fragment of the dried soil is pressed between the fingers. Fragments which cannot be crumbled or broken are characteristic of clays with high plasticity. Fragments which can be disintegrated with gentle finger pressure are characteristic of silty materials with low plasticity.

Dispersion Test: The dispersion test is useful for distinguishing between silt and clay, and for making a rough estimate of the relative amounts of sand, silt, and clay in the soil. A small quantity of the soil is dispersed with water in a glass cylinder and then allowed to settle. The coarser particles fall out first and the finest particles remain in suspension the longest. Sand settles in 30 to 60 seconds. Materials of silt size settle in 15 to 60 minutes, whereas clay size particles remain in suspension for at least several hours and usually for several days, unless the particles of clay combine in groups or floccules.

The percentages of clay and silt in the sample and the major soil type defined in the modified Burmister classification system based on the plasticity test are described in Table 2 below:

TABLE 2

CLAY vs SILT:			
Plasticity	**Plasticity Index**	**Identity**	**Smallest Diameter Rolled**
Non-plastic	0	SILT	None
Slight	1 - 5	Clayey SILT	¼ inch
Low	5 - 10	SILT & CLAY	⅛ inch
Medium	10 - 20	CLAY & SILT	1/16 inch
High	20 - 40	Silty CLAY	1/32 inch
Very High	> 40	CLAY	1/64 inch

7.4 Special Components

Examine the soil sample to identify other components that may be present:

- Roots or root mass
- Vegetation, peat, organic matter
- Shells or fossils
- Accessory minerals such as mica, gypsum, and magnetite
- Slag, cinder or charcoal, trash, rubbish, fill, bricks, glass

For urban fill, write "(FILL)" after the description, in all caps.

7.5 Odors

Soil odor should be characterized as organic or chemical. Some decaying organic soils may exhibit a rotten egg or vegetable odor, whereas contaminated soil may have a petroleum or chemical smell. Caution should be used and soil odors should not be inhaled directly if contaminants are suspected.

7.6 Photoionization Ionization Detectors (PIDs)

PIDs should be used to screen soil for evidence of contamination based on the presence of volatile organic compounds (VOCs). Weather conditions, temperature, and moisture content of the sample may affect the readings. PID readings should be recorded on the appropriate log or in the field book, and should include the screening depth interval and any other descriptors (i.e., staining or other discoloration).

Refer to the Textural Triangle and Soil Characterization Field Guide included as Attachment D. The Soil Characterization Field Guide is formatted for easy printing; Hazpubs or Productions can prepare a laminated copy to bring on-site for reference.

8.0 SOIL LOGGING FORMAT

The modified Burmister classification system is intended for uniform soils only, and different layers should be described separately. Descriptions should be written in the following order:

- Density/consistency
- Color
- Grain size
- Major soil type (**ALL CAPS**)
- Minor constituents (**C**apitalized)
- Special components ("FILL", odors, etc.)

Each characteristic should be separated by commas. Odors and PID readings should be written in the appropriate section on the appropriate log. The following guidelines should be followed:

1. For sand, list color first (ex.: **yellow SAND)**. See the Soil Characterization Field Guide for sand size gradations (fine, medium, and coarse). If only part of the sand size range is noted, describe what is present (ex.: **medium to coarse SAND)**. If the full size range (fine through coarse sand) is present, just describe as **SAND**.
2. For the main soil component(s), i.e., components estimated as 35% - 50% of the soil by mass, use all capital letters, e.g., **SAND** (for one main component) or **SAND and BRICK** (for more than one main component).
3. For other soil components, capitalize only the first letter (ex.: **Silt**).
4. For non-main soil components, estimate what percentage of the soil it comprises by mass: "some" – 20% to 35%, "little" – 10 to 20%, or "trace" – 1 to 10%.
5. As moisture is lost during continued manipulation, the soil approaches a non-plastic condition and becomes crumbly. Just before the crumbly state is reached, a highly plastic clay can be rolled into a long thread, with a diameter of approximately 3 millimeters (mm), which has sufficient strength to

support its own weight. Silt, on the other hand, can seldom be rolled into a thread with a diameter as small as 3mm without severe cracking, and is completely lacking in tensile strength unless small amounts of clay are present. The record of a simple plasticity test should indicate not only whether a plastic thread can be formed, but also the toughness of the thread as it nears the crumbling stage. This condition is described as weak and friable, medium, or tough.

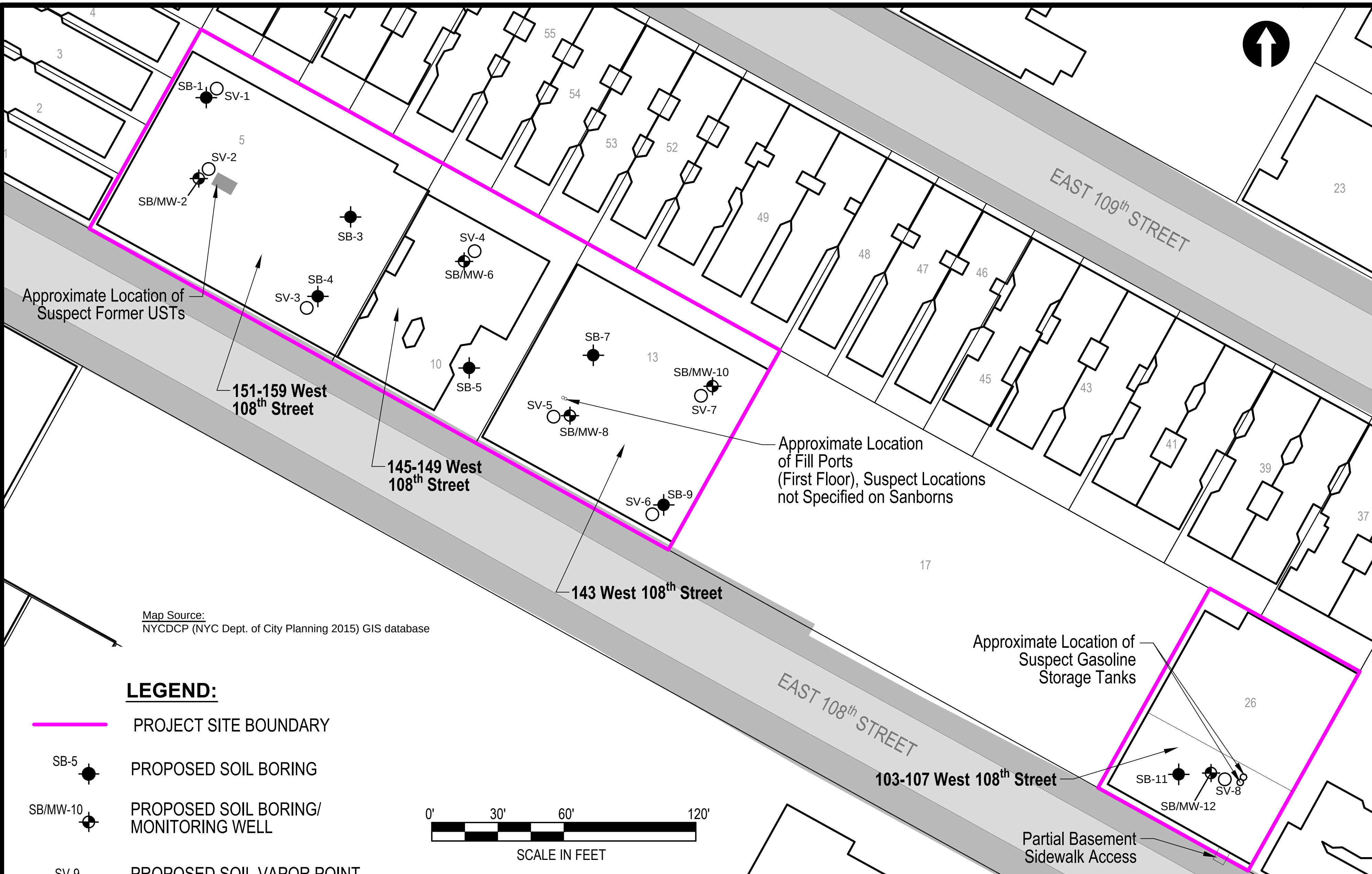
6. Separate lists of non-main soil components in each percentage group by commas, without using “and” (ex.: **some fine Gravel, Silt, Ash, trace Glass, Brick**).
7. Gravel encountered in soil borings will generally be **fine Gravel** (under ¾ inch across) due to the diameter of the sampler. For test pits, larger rock sizes (**coarse gravel, cobbles,** and/or **boulders**) may be present, and a boulder count must be included in the test pit log, as noted in SOP # H-SI-04.
8. Note potential fill materials in the log [ex.: **Yellow SAND, some fine Gravel, trace Silt, Brick, Concrete (FILL)**]. Fill is generally identified by the presence of man-made materials; however, sometimes there is no clear evidence whether soil is fill or native.
9. When describing odors, describe them as “like” (ex., **petroleum-like**, **chemical-like**) in the appropriate log. Since odor is determined by the individual, odor is difficult to identify with confidence and it should it include a qualifier.

Some examples of proper Modified Burmister are:

- Brown SAND, some fine Gravel, little Silt.
- Gray-brown SILT, lenses of fine SAND.
- Loose red-brown SAND and GRAVEL, little Silt, trace Clay.
- Red BRICK, some Ash, trace Sand, Concrete (FILL).
- Gray organic SILT, some organic Clay, trace Shells, Peat.
- Very Stiff yellow CLAY, some Silt, trace fine Gravel.

Examples of completed soil boring and test pit logs are included as Attachments B and C, respectively.

ATTACHMENT A:
EXAMPLE FIGURE



LEGEND:

	PROJECT SITE BOUNDARY
SB-5	PROPOSED SOIL BORING
SB/MW-10	PROPOSED SOIL BORING/ MONITORING WELL
SV-9	PROPOSED SOIL VAPOR POINT
17	LOT NUMBER
	LOT LINE
	BUILDING LINE
UST	UNDERGROUND STORAGE TANK

103-107 and 143-159 West 108th Street

New York, New York

PROJECT SITE DETAIL AND PROPOSED SAMPLING LOCATIONS

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

DATE 3/1/2016
PROJECT No. 22304
SCALE as shown
FIGURE 2

ATTACHMENT B:
EXAMPLE & SOIL BORING LOG TEMPLATE

SOIL BORING LOG	AKRF Project Number:	Soil Boring ID:	SB-
		Sheet 1 of 2	

AKRF 440 Park Avenue South, 7th Floor New York, NY 10016			
Drilling Method:		Drilling	
Sampling Method:		Start Time:	Finish Time:
Driller:			
Weather:	°F,	Date:	
Logged By:	, AKRF		

Depth (feet)	Recovery (Inches)	Surface Condition:	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Notes: Soil sample analyzed for
Groundwater encountered at approximately X **feet below grade during soil boring installation.** OR **Groundwater not encountered**
End of soil boring at feet below grade.

PID = photoionization detector ppm = parts per million **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING LOG	AKRF Project Number:	Soil Boring ID: Sheet 1 of 2	SB-

AKRF 440 Park Avenue South, 7th Floor New York, NY 10016			Drilling	
	Drilling Method:		Start Time:	Finish Time:
	Sampling Method:			
	Driller:			
	Weather:	°F,	Date:	
	Logged By:	, AKRF		

Depth (feet)	Recovery (Inches)	Surface Condition:	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

Notes: Soil sample analyzed for
Groundwater encountered at approximately X feet below grade during soil boring installation. OR Groundwater not encountered
End of soil boring at feet below grade.

PID = photoionization detector ppm = parts per million **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING LOG

SOIL BORING LOG	**Atlantic Chestnut - Lot 3** **275 Chestnut Street, Brooklyn, NY** **AKRF Project Number: 12184**	**Soil Boring ID:** **Sheet 1 of 1**	**L3-RI-SB-11**

AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016

Drilling Method:	Geoprobe 7730DT/DPP	**Drilling**			
Sampling Method:	5' Macrocore	**Start Time:**	11:30	**Finish Time:**	12:10
Driller:	Aarco Environmental				
Weather:	50 °F, Cloudy	**Date:**	12/5/2016		
Logged By:	A. Bosco, AKRF				

Depth (feet)	Recovery (Inches)	Surface Condition: Concrete	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1–5	44	Brown SAND, little fine Gravel, trace Silt (FILL).	ND	Dry	ND	ND	
6–10	46	Brown SAND, little Silt, fine Gravel (FILL).	ND	Dry	ND	ND	
11–15	55	Top 28": Brown SAND, little Silt, fine Gravel.	ND	Dry	ND	ND	L3-RI-SB-11 (12-13') 20161205
		Brown 27": Brown SAND, little Silt.	ND	Dry	ND	ND	
16–20	53	Brown SAND, little Silt.	ND	Dry	ND	ND	
21–25	54	Brown SAND, little Silt.	ND	Dry	ND	ND	
26–30	50	Top 39": Brown SAND, little Silt.	ND	Dry	ND	ND	
		Bottom 11": Brown SAND.	ND	Wet @ 29'	ND	ND	L3-RI-SB-11 (28-29') 20161205

Notes: End of boring at approximately 30 feet below grade. Soil samples analyzed for VOCs, SVOCs, PCBs, pesticides, and TAL metals (including hexavalent chromium). Groundwater encountered at approximately 29 feet below grade.

PID = photoionization detector ppm = parts per million NAPL = non-aqueous phase liquid ND = not detected

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

ATTACHMENT C:
EXAMPLE & TEST PIT LOG TEMPLATE

TEST PIT LOG	Site Name Site Address AKRF Project Number: XXXX	Test Pit ID: Sheet 1 of 1	TP- #

AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016

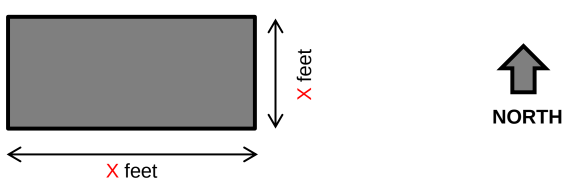
Machine Type:	XXXX
Sampling Method:	XXXX
Operator:	XXXX
Weather:	XX °F, XX (conditions)
Logged By:	Initial. Last Name, AKRF

Drilling

Start Time: ##:##	Finish Time: ##:##
Date: XX/XX/XXXX	

Depth (feet)	% Debris	Surface Condition: XXXXXX	Odor	Moisture	PID (ppm)	NAPL	Boulders	Soil Samples Collected for Laboratory Analysis
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Test Pit Scale Drawing:



Test Pit Dimesions:
Length: X feet
Width: X feet
Depth: X feet

Notes: Groundwater Depth Indicator
Soil samples analyzed for X by EPA Method X, …..
Groundwater encountered at approximately X feet below grade during test pit excavation. OR Groundwater not encountered during test pit exc
End of test pit at X feet below grade.

PID = photoionization detector **ppm = parts per million** **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

TEST PIT LOG

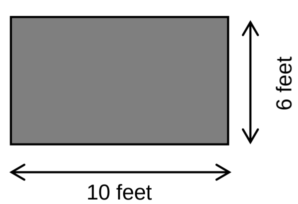
New 470 Project 12 Eckford Street Brooklyn, New York AKRF Project Number: 12306	Test Pit No. **TP-1** Sheet 1 of 1

AKRF
440 Park Avenue South, New York, NY 10016
Phone (212) 696-0670 Fax (212) 726-0942

Method: Excavator	**Excavating**		
Sampling Method: Test Pit	**Start Time:** 8:40	**Finish Time:** 9:15	
Operator: Eastern Environmental			
Sampler: Matthew Levy, AKRF	**Date:** 10/5/2016		
	Weather: 70 °F, Mostly Sunny		

Depth (feet)	% Debris	Surface Condition: FILL	Odor	Moisture	PID (ppm)	NAPL	Boulders	Samples Collected for Lab Analysis
1–3	5	Top 18": Light brown SAND, some Silt, trace Brick, Concrete, Gravel (FILL).	ND	Dry	ND	ND	None	TP-1 (0-12) 20161005
4–5		Bottom 42": Brown SAND, some Silt, trace Brick, Concrete, Gravel (FILL).	ND	Dry	100	ND	None	
6	5	Top 12": Brown SAND, some Silt, trace Brick, fine Concrete, Gravel (FILL).	ND	Dry	300	ND	None	
7–10	30	Bottom 48": Brown SAND, some Ash, trace Gravel (FILL).	ND	Dry	700	ND	None	
11–12	5	Dark Brown SAND, some Silt, Organics, trace fine Gravel.	ND	Dry	1,000	ND	None	TP-1 (12) 20161005 TP-1 (12)V 20161005

Test Pit Scale Drawing:



NORTH

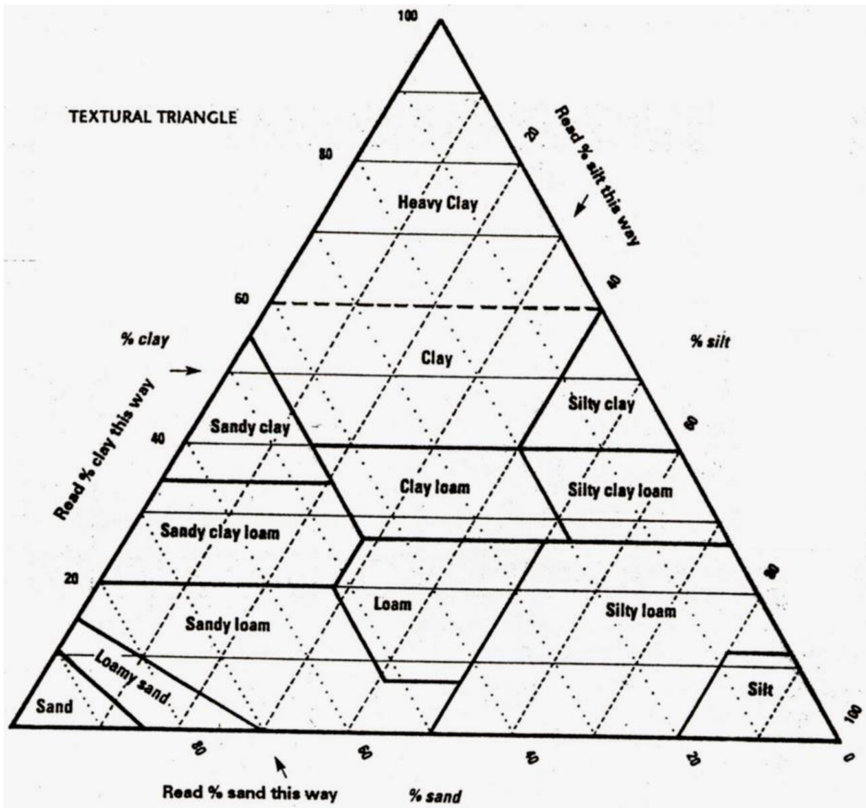
Test Pit Dimesions:
Length: 10 feet
Width: 6 feet
Depth: 12 feet

Notes:
End of test pit at 12 feet below grade.
Soil samples analyzed for TCL VOCs by EPA Method 8260.
Groundwater was not encountered.
PID = photoionization detector **ppm = parts per million** **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

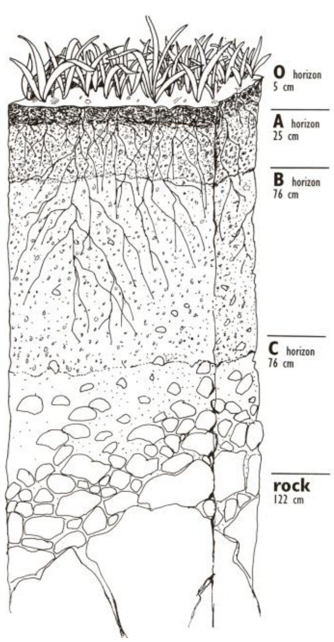
ATTACHMENT D:
TEXTURAL TRIANGLE AND SOIL CHARACTERIZATION FIELD GUIDE

<u>All You Need to Know About Soils</u>
(Official ECO Studies Cheat Sheet)



Texture Classification Practice:
10% sand and 80% silt = _______________________
20% clay and 60% sand = ______________________
40% silt and 40% sand = _______________________

Soil Horizons



Organic Horizon – organic material (plant and animal material laying on the soil surface (litter) and partially decomposed material (humus)

A Horizon – dark accumulation of humus and mineral material, considered the zone of *eluviation* or downward movement of nutrients due to *infiltration* of water from the surface (A and O equal top soil)

B Horizon – lighter in colour than the A horizon as it is not as rich in humus. This portion of the subsoil is considered the zone of *illuviation*, which refers to the deposition of minerals and clay that were leached from above

C Horizon – layer of unconsolidated, weathered parent material that has not undergone any formal soil formation processes. Plant roots and micro-organisms are rare in the C horizon and therefore little organic matter can be found here.

Bedrock – solid rock underlying the unconsolidated material above

Soil Quick Facts

1. The four main components of soil are ____________________, ____________________, _________________, ____________________.
2. The three most important soil properties that need to be considered when determining an area's suitability to specific plant species or agricultural techniques are: _____________, ________________, ________________.
3. Only ____ percent of Canada's land area is suitable for agriculture.
4. Soil structure refers to the arrangement of soil particles. Common soil structures are: ____________, ___________, ___________, __________.
5. Peds are small natural lumps or clusters of soil particles that in part determine the characteristics of soil structure.
6. Soil colour is an important indication of composition and chemical make-up. Red coloured soils indicates the presence of _________. White coloured soil can indicate areas of extreme ___________. Grey or bluish grey soils indicate high a proportion of _____________ ____and ______________ conditions. Dark brown or black soil are usually rich in plant nutrients (organic material).
7. Micro-organisms in the soil help in the process of ______________ fixation and processing of other nutrients.
8. Worms aid in creating a healthy aerated soil structure as well as adding nutrients to the soil. Worms breathe through their __________ and therefore must come to the surface when the soil becomes saturated or they will drown.

How Does Soil Feel?

Sandy soil feels gritty due to its granular nature and large particle size and does not hold together well, especially when dry.
Soils with a **high silt content** feels silky smooth and will ooze through you fingers when you squish it.
Soils containing large percentages of **clay** feel sticky and generally hold together well. In many cases it is possible to form a ribbon of clay that stays together.

Soil Classification

Brunisols – young soil that is mainly brown in colour and exhibits little definition between A and B horizons. The only distinct boundary is between the B and C horizons.
Chernozems – soils with thick organic rich A horizons, common in prairie areas.
Cryosols – forms in organic or mineral soils that have a permafrost layer near the surface.
Gleysols – found in low lying areas rich in clay that are saturated for much of the year.
Podzols – forest soils that are well weathered and have a highly eluviated A horizon that is typically acidic. Eluviated area is often whitish grey due to the leaching of nutrients.
Regisols – Young undeveloped soils with no clear horizonation
Organic Soils – No horizonation but high organic content and must be at least 30cm thick.
Solonetic – exhibit B horizons which are hard when dry but swell when saturated with water. Usually have a columnar structure and develop in places rich in salty parent materials.
Luvisols – have A horizons that are light coloured due to eluviation and possesses a dark clay rich B horizon. Often exist in forest environments with imperfect drainage.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

SOIL BORING OVERSIGHT AND SAMPLING

SOP#: H-SI-03

March 2018

Prepared By:

Name: Axel Schwendt Signature: Date: 3-21-18

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Approved By:

Name: Michelle Lapin Signature: Date: 3-21-18

Approved By:

Name: Marcus Simons Signature: Date: 3-21-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to conduct soil boring investigations. This SOP applies specifically to the advancement and documentation of environmental borings. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

Soil borings are typically advanced with a mechanical drill rig, manually-operated drill rig, or hand auger to: observe and document subsurface soil conditions; collect soil, groundwater, and/or soil vapor samples; and/or install temporary or permanent groundwater monitoring wells. Soil borings may also be advanced to enable the injection of remedial solutions, such as for in-situ chemical oxidation (ISCO) applications.

All activities will be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be utilized or cross-referenced during soil boring oversight and sampling, as applicable:

SOP #H-FW-01	Safety for Subsurface Investigations
SOP #H-II-05	Geophysical Survey
SOP #H-SI-01	Safety/Utility Clearance for Subsurface Investigation
SOP #H-SI-02	Soil Classification and Logging
SOP #H-SI-04	Test Pit Oversight and Sampling
SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-06	Groundwater Monitoring Well Installation – Bedrock
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-08	Standard Groundwater Sampling
SOP #H-SI-09	Low-Flow Groundwater Sampling
SOP #H-SI-10	Soil Vapor Sampling
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste
SOP #H-RA-05	In-Situ Treatment Oversight

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- OSHA Level D PPE
- Nitrile Gloves
- Oil/Water Level Indicator & Decontamination Supplies
- Measuring Tape or Wheel
- Photoionization Detector (PID) & Calibration Kit
- Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- Sampling Jars/Collection Equipment for Contingent Soil or Groundwater Sampling
- Ziploc bags
- Permanent Marker and Field Book
- Spray Paint/Marking Flags
- Drum Labels
- Respirator (in case upgrading to Level C PPE is required)
- Hand auger (if limited drill rig access is anticipated)
- Groundwater sampling equipment (see SOP #H-SI-08 or #H-SI-09)

5.0 DOCUMENT LIST

The following documents are required, and/or should be reviewed/referenced, at a minimum, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Scope of Work (e.g., Phase II Work Plan, RI Work Plan, or proposal)
- Soil boring/monitoring well logs from previous investigations, if any
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Boring and/or Monitoring Well Locations (See Attachment A for a Figure Example)
- AKRF Soil Boring Logs (see Attachment B for the Soil Boring Log Template and a completed example), to be completed during implementation of this SOP
- The Monitoring Well Installation Log included in SOP #H-SI-05 or #H-SI-06, if applicable
- Related SOPs Listed in Section 3.0

6.0 PRIOR TO COMMENCING FIELD WORK

Procedures to be completed prior to commencing field work are described below:

1. Ensure that the proper utility mark-outs have been requested by the driller/subcontractor, or call them in yourself, at least 5 business days before field work starts. Documentation should be requested from the driller (or obtained from the affected utility companies) confirming that the mark-outs have been completed prior to conducting the work.

2. If a geophysical survey is conducted (see SOP #H-II-05), note the locations of anticipated utility lines and anomalies on a map with measurements obtained using a tape measure or measuring wheel. Do not rely solely on spray paint markings made by the geophysical contractor, as they may wash away with time.

3. Review the applicable SOPs listed in Section 3.0.
4. Gather the necessary equipment (see Section 4.0) and documents (see Section 5.0).

7.0 DURING FIELD WORK – SITE INVESTIGATION

Procedures for soil boring oversight and sampling during site investigation activities are described below:

1. Make sure the field crew is wearing appropriate PPE, including hearing protection.
2. Calibrate field instruments in accordance with the manufacturer's specifications and note the calibration results in the field book.
3. If there is a site-specific HASP, conduct a tailgate meeting and have the contractor sign the signature page of the HASP.
4. Select boring locations. The borings may need to be moved from the proposed locations based on access considerations, utility mark-outs, geophysical survey findings, etc. If relocation is needed, discuss alternate locations with the Project Manager.
5. Measure each boring location (from site boundaries or other landmarks, such as buildings), and document the measurements in the field notes and/or include a sketch with the measurements. At larger sites where adequate satellite signal can be acquired, GPS may be used in addition to measurements from site boundaries/landmarks.
6. Soil borings will typically be advanced using either hollow stem auger (HSA) or direct push probe (DPP) techniques. HSA samples are typically collected on a continuous basis using a 2-foot long, 2-inch diameter spilt-spoon sampler. DPP soil samples are typically collected on a continuous basis using a 2-foot to 5-foot (depending on rig type), 2-inch diameter, macro-core piston rod sampler fitted with an acetate liner. For locations with limited access, a manually-operated DPP unit may be used. The macro-core can be operated as both an open-tube sampler and a discrete sampler. If an open-tube sample is to be collected, the sampler is simply driven to the desired depth and subsequently withdrawn to obtain the soil sample. If a discrete sample is to be collected, the push probe operator will insert a retainer rod through the sampler to prevent soil from entering the sampler while it is being driven. Upon reaching the top of the desired sample depth interval, the retainer rod will be removed and the sampler will then be driven the length of the sampling tube. The rods and sampler will then be withdrawn to obtain the discrete soil sample.
7. After the sampler is removed, expose the soil core by opening the split-spoon (for HSA samples) or cutting the acetate liner lengthwise (for DPP samples). Take a representative photo of each core.
8. During soil core removal from the boring, conduct air monitoring of the breathing space with the PID and any other equipment required by the HASP. If a site-specific HASP exists, follow the action levels specified within the document. If no site-specific HASP exists, the generic AKRF HASP specifies upgrading to Level C PPE if PID readings reach 10 parts per million (ppm), and stopping work (until elevated VOC levels dissipate) if readings reach 20 ppm. Note the PID readings in field book and, if required by the site-specific HASP, in an air monitoring log (see SOPs #H-FW-02 and #H-RA-03).
9. Field-screen the opened cores using a PID, either by placing a small quantity of soil into a Ziploc bag and inserting the PID probe, or by opening a cavity in the soil core and inserting the PID probe into the cavity. [Note: If inserting the PID probe into an open cavity, take care to ensure that the probe is not clogged with soil or exposed to excessive moisture or wet conditions, which will lead to

malfunction of, or could damage, the PID.] For soil cores recovered from borings, take PID readings at several intervals (approximately every 6 inches to 1 foot) over the length of the core.

10. Observe and log the soil cores using the soil boring log included in Attachment B. The cores should be classified using the modified Burmister classification system (see SOP #H-SI-02). Note distinct changes in soil layers (if distinguishable), the depth to water (if observed), any evidence of contamination (e.g., odors, staining, and/or elevated PID readings), any evidence of urban fill (e.g., fragments of building materials, ash, coal, wood, and/or ceramics), and any soil/groundwater sample collection. In the absence of a temporary well point or monitoring well, the water table is typically estimated as the point in which the soil matrix is water-saturated. Record the time at which water level measurements are made in case levels fluctuate (e.g., tidally influenced).
11. For borings advanced using an HSA rig, the soil boring log should include blow counts provided by the driller. The blow counts are obtained by advancing the auger to the top of the desired sample depth, then driving the split-spoon through the sampling interval with a 140-pound hammer falling 30 inches, constituting a standard penetration test. Blow counts should be recorded at 6-inch intervals (refer to SOP #H-SI-02).
12. During soil sample collection, collect volatile organic compounds (VOC) samples promptly (and first) to minimize loss by volatilization. Note the approximate depth interval of sample collection. Discuss the sample naming convention to be used with the Project Manager.
13. If a temporary groundwater monitoring well is to be installed, note the well material, diameter, and screening interval on the soil boring log. Measure approximate depth to groundwater (to the nearest 0.1 foot) using an interface probe. See Section 8.0 for further details.
14. If evidence of contamination is noted, call the Project Manager. Additional borings may be appropriate for delineation.
15. If the boring encounters refusal, note the depth of refusal and the suspected cause in the field notes and on the boring log. Drillers may be able to assist with determining what is causing refusal based on the nature of the soil, any fragments in the tip of the drilling probe, and/or the "feel" of drilling. If refusal is encountered before the proposed termination depth, call the Project Manager to determine if an additional boring should be advanced at a nearby location to complete the scope of work.
16. If a layer of peat or clay (i.e., relatively impermeable material that may serve as a barrier to contamination) is noted in the boring, discuss with the Project Manager whether this layer should be grouted when the boring is completed, to reduce the potential of contaminant migration.
17. When the boring is complete, replace the soil in the borehole unless there is too much soil to replace (e.g., if a permanent monitoring well was installed), or the soil is grossly contaminated (e.g., contains petroleum product) or cannot be replaced for another reason (e.g., it is known hazardous waste or the work plan requires drumming). If no permanent monitoring well was installed, the driller should patch the boring to match the surrounding surface, using asphalt or concrete, if necessary.
18. If soil cannot be returned to the boring, containerize the soil in a DOT-approved 55-gallon drum. Drums should be staged securely, labeled immediately and removed for off-site disposal as soon as possible (see SOP #H-SI-13).
19. Non-dedicated drilling equipment should be decontaminated between borings in accordance with SOP #H-SI-12 and any site-specific HASP or QAPP.
20. Call the Project Manager to notify them of the completion of the work and any significant observations.

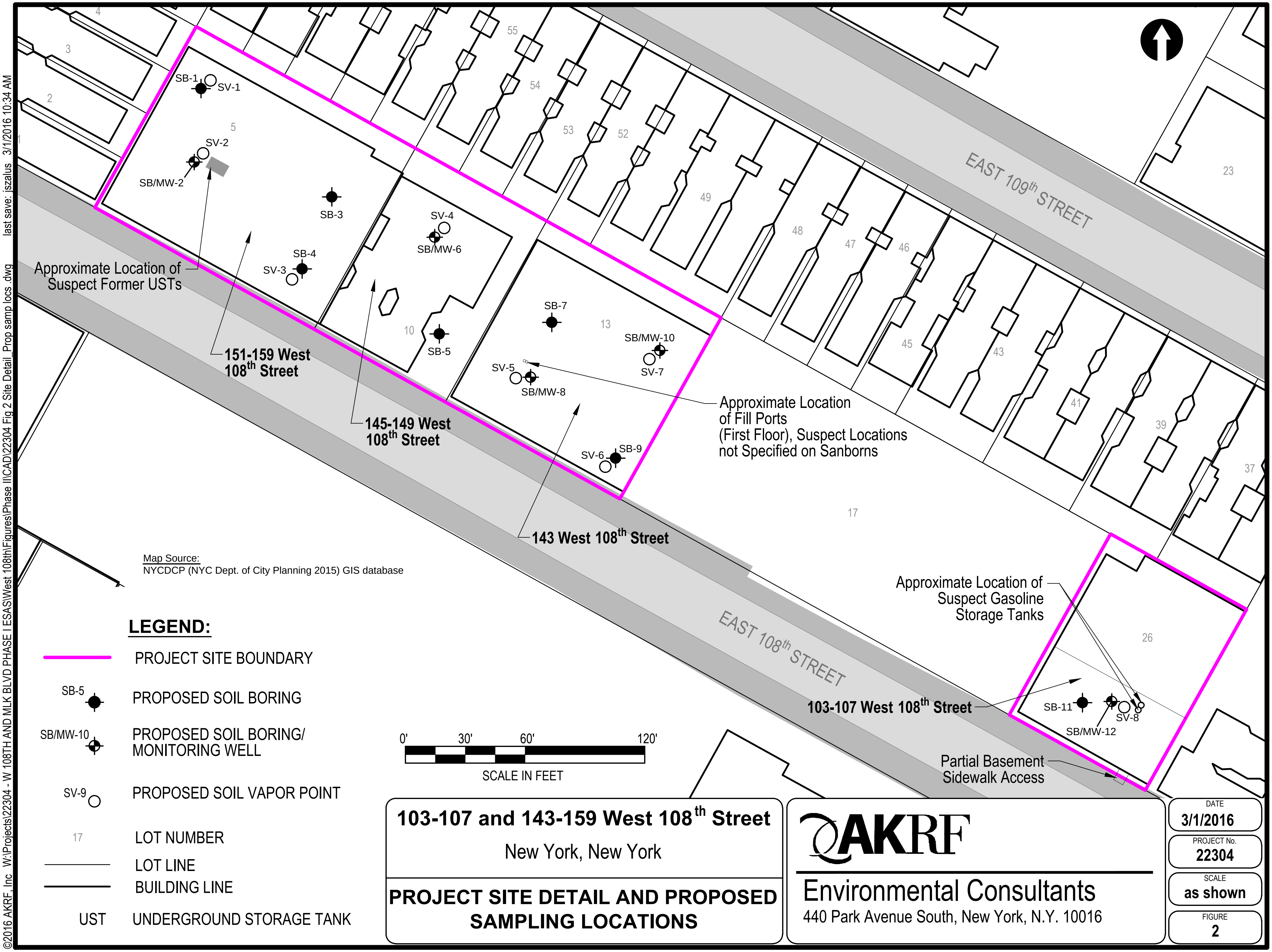
8.0 DURING FIELD WORK – MONITORING WELL INSTALLATION

After a boring is advanced (see Section 7.0), determine the approximate depth to groundwater and the required screening interval. Generally, monitoring wells should be installed with the screen placed across the water table. The exception would be for monitoring wells installed in known dense non-aqueous phase liquid or chlorinated solvent contamination sites. These wells should be screened deeper than across the water table. For well installation procedures, see SOP #H-SI-05 (wells in overburden) or #H-SI-06 (wells in bedrock). Following installation, the well must be developed (see SOP #H-SI-07). Monitoring well sampling procedures are described in SOP #H-SI-08 (standard groundwater sampling) and #H-SI-09 (low-flow groundwater sampling).

9.0 DURING FIELD WORK – IN-SITU TREATMENT

These borings are typically advanced to create a conduit to the subsurface for injection of remedial solutions, and may not involve recovery of soil cores for logging and observation. At this stage, subsurface conditions and the approximate depth to groundwater should be known from prior investigations. Refer to SOP #H-RA-05 or site-specific work plans for in-situ treatment oversight procedures.

ATTACHMENT A:
EXAMPLE FIGURE



SB-1
SV-1
SV-2
SB/MW-2
SB-3
SB-4
SV-3
SV-4
SB/MW-6
SB-5
SB-7
SB/MW-10
SV-7
SV-5
SB/MW-8
SV-6
SB-9
SB-11
SB/MW-12
SV-8
Approximate Location of Suspect Former USTs
151-159 West 108th Street
145-149 West 108th Street
143 West 108th Street
103-107 West 108th Street
Approximate Location of Fill Ports (First Floor), Suspect Locations not Specified on Sanborns
Approximate Location of Suspect Gasoline Storage Tanks
Partial Basement Sidewalk Access
EAST 109th STREET
EAST 108th STREET
Map Source:
NYCDCP (NYC Dept. of City Planning 2015) GIS database
LEGEND:
PROJECT SITE BOUNDARY
PROPOSED SOIL BORING
PROPOSED SOIL BORING/ MONITORING WELL
PROPOSED SOIL VAPOR POINT
LOT NUMBER
LOT LINE
BUILDING LINE
UST UNDERGROUND STORAGE TANK
0' 30' 60' 120'
SCALE IN FEET
103-107 and 143-159 West 108th Street
New York, New York
PROJECT SITE DETAIL AND PROPOSED SAMPLING LOCATIONS
AKRF
Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016
DATE 3/1/2016
PROJECT No. 22304
SCALE as shown
FIGURE 2
©2016 AKRF, Inc W:\Projects\22304 - W 108TH AND MLK BLVD PHASE I ESAS\West 108th\Figures\Phase II\CAD\22304 Fig 2 Site Detail_Prop samp locs.dwg last save: jszalus 3/1/2016 10:34 AM

ATTACHMENT B:
EXAMPLE & SOIL BORING LOG TEMPLATE

<table>
<tr><td rowspan="2">SOIL BORING LOG</td><td rowspan="2">AKRF Project Number:</td><td>Soil Boring ID:</td><td rowspan="2">SB-</td></tr>
<tr><td>Sheet 1 of 2</td></tr>
</table>

<table>
<tr><td rowspan="5">AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016</td><td>Drilling Method:</td><td></td><td colspan="2">Drilling</td></tr>
<tr><td>Sampling Method:</td><td></td><td rowspan="2">Start Time:</td><td rowspan="2">Finish Time:</td></tr>
<tr><td>Driller:</td><td></td></tr>
<tr><td>Weather:</td><td>°F,</td><td colspan="2" rowspan="2">Date:</td></tr>
<tr><td>Logged By:</td><td>, AKRF</td></tr>
</table>

Depth (feet)	Recovery (Inches)	Surface Condition:	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
1 2 3 4 5							
6 7 8 9 10							
11 12 13 14 15							
16 17 18 19 20							

Notes: Soil sample analyzed for
Groundwater encountered at approximately X feet below grade during soil boring installation. OR Groundwater not encountered
End of soil boring at feet below grade.

PID = photoionization detector ppm = parts per million **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING LOG	AKRF Project Number:	Soil Boring ID: Sheet 1 of 2	SB-

AKRF 440 Park Avenue South, 7th Floor New York, NY 10016				
	Drilling Method:		Drilling	
	Sampling Method:		Start Time:	Finish Time:
	Driller:			
	Weather:	°F,	Date:	
	Logged By:	, AKRF		

Depth (feet)	Recovery (Inches)	Surface Condition:	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							

Notes: Soil sample analyzed for
Groundwater encountered at approximately X **feet below grade during soil boring installation.** OR **Groundwater not encountered**
End of soil boring at feet below grade.

PID = photoionization detector ppm = parts per million **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING LOG	Atlantic Chestnut - Lot 3 275 Chestnut Street, Brooklyn, NY AKRF Project Number: 12184		Soil Boring ID: Sheet 1 of 1	L3-RI-SB-11
AKRF 440 Park Avenue South, 7th Floor New York, NY 10016	Drilling Method:	Geoprobe 7730DT/DPP	Drilling	
	Sampling Method:	5' Macrocore	Start Time: 11:30	Finish Time: 12:10
	Driller:	Aarco Environmental		
	Weather:	50 °F, Cloudy	Date:	12/5/2016
	Logged By:	A. Bosco, AKRF		

Depth (feet)	Recovery (Inches)	Surface Condition: Concrete	Odor	Moisture	PID	NAPL	Samples Collected for Lab Analysis
1–5	44	Brown SAND, little fine Gravel, trace Silt (FILL).	ND	Dry	ND	ND	
6–10	46	Brown SAND, little Silt, fine Gravel (FILL).	ND	Dry	ND	ND	
11–15	55	Top 28": Brown SAND, little Silt, fine Gravel.	ND	Dry	ND	ND	L3-RI-SB-11 (12-13') 20161205
		Brown 27": Brown SAND, little Silt.	ND	Dry	ND	ND	
16–20	53	Brown SAND, little Silt.	ND	Dry	ND	ND	
21–25	54	Brown SAND, little Silt.	ND	Dry	ND	ND	
26–30	50	Top 39": Brown SAND, little Silt.	ND	Dry	ND	ND	
		Bottom 11": Brown SAND.	ND	Wet @ 29'	ND	ND	L3-RI-SB-11 (28-29') 20161205

Notes: End of boring at approximately 30 feet below grade. Soil samples analyzed for VOCs, SVOCs, PCBs, pesticides, and TAL metals (including hexavalent chromium). Groundwater encountered at approximately 29 feet below grade.

PID = photoionization detector ppm = parts per million NAPL = non-aqueous phase liquid ND = not detected

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

TEST PIT OVERSIGHT AND SAMPLING

SOP#: H-SI-04

March 2018

Prepared By:

Name: Axel Schwendt Signature: ______ Date: 3-21-18

Prepared By:

Name: Asya Bychkov Signature: ______ Date: 3-21-18

Approved By:

Name: Michelle Lapin Signature: ______ Date: 3-21-18

Approved By:

Name: Marcus Simons Signature: ______ Date: 3-21-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to conduct and document test pit investigations. This SOP applies to the excavation of environmental test pits. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

An investigation involving test pits typically entails the excavation of pits or trenches with an excavator/backhoe to observe and document soil conditions, collect soil and potentially groundwater samples, and/or inspect the subsurface for the potential presence of underground storage tanks (USTs), buried utilities, etc.

While subsurface investigations are frequently conducted via the advancement of soil borings, test pits are useful in cases where: the potential presence of a UST (e.g., an anomaly identified by a geophysical survey or buried tanks noted on historical maps) is being investigated; construction is in progress and a backhoe or excavator is readily available on-site (i.e., the additional expense of retaining a driller does not need to be incurred); and/or the investigation aims to inspect the composition of the subsurface for boulders and/or large objects (which can only be observed as fragments in a boring).

Potential downsides of conducting an investigation via test pits rather than borings include: greater potential for soil stratum disturbance; greater potential for volatile organic compound (VOC) volatilization prior to discrete sampling collection; and depth limitations (borings can achieve significantly greater depths).

All activities will be conducted in conformance with AKRF’s company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be utilized or cross-referenced during test pit oversight and sampling, as appropriate:

SOP #H-SI-01	Safety for Subsurface Investigations
SOP #H-II-04	Tank Assessment
SOP #H-II-05	Geophysical Survey
SOP #H-SI-01	Safety/Utility Clearance for Subsurface Investigation
SOP #H-SI-02	Soil Classification and Logging
SOP #H-SI-03	Soil Boring Oversight and Sampling
SOP #H-SI-08	Standard Groundwater Sampling
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste
SOP #H-RA-01	Storage Tank Removal/Closure
SOP #H-RA-03	Particulate Air Monitoring

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- OSHA Level D PPE
- Nitrile Gloves
- Oil/Water Level Indicator & Decontamination Supplies (if groundwater is anticipated to be encountered)
- Measuring Tape or Wheel
- Photoionization Detector (PID) & Calibration Kit
- Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- Sampling Jars/Collection Equipment for Contingent Soil or Groundwater Sampling
- Ziploc Bags
- Permanent Marker and Field Book
- Spray Paint/Marking Flags
- Drum Labels
- Respirator (in case upgrading to Level C PPE is required)
- Hand auger (optional – may be helpful for collecting soil samples)
- Bailer and string (if groundwater sampling is anticipated)

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Scope of Work (ex., Phase II Work Plan, RI Work Plan, or proposal)
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Test Pit Sizes and Locations, if available (See Attachment A for a Figure Example)
- AKRF Test Pit Logs (see Attachment B for the Test Pit Log Template and a completed example), to be completed during implementation of this SOP
- Related SOPs Listed in Section 3.0

6.0 PRIOR TO COMMENCING FIELD WORK

Procedures to be completed prior to commencing field work are described below:

1. Make sure the contractor has called in utility mark-outs. In rare cases, you may need to place the call yourself, at least 5 business days before field work starts.
2. If a geophysical survey is conducted (see SOP #H-II-05), sketch encountered utility lines and anomalies on a map, and measure their locations using a tape measure or measuring wheel. Do not rely solely on spray paint markings made by the geophysical contractor, as they may wash away with time.
3. Review the applicable SOPs listed in Section 3.0.
4. Gather the necessary equipment (see Section 4.0) and documents (see Section 5.0).

7.0 DURING FIELD WORK – SITE INVESTIGATION

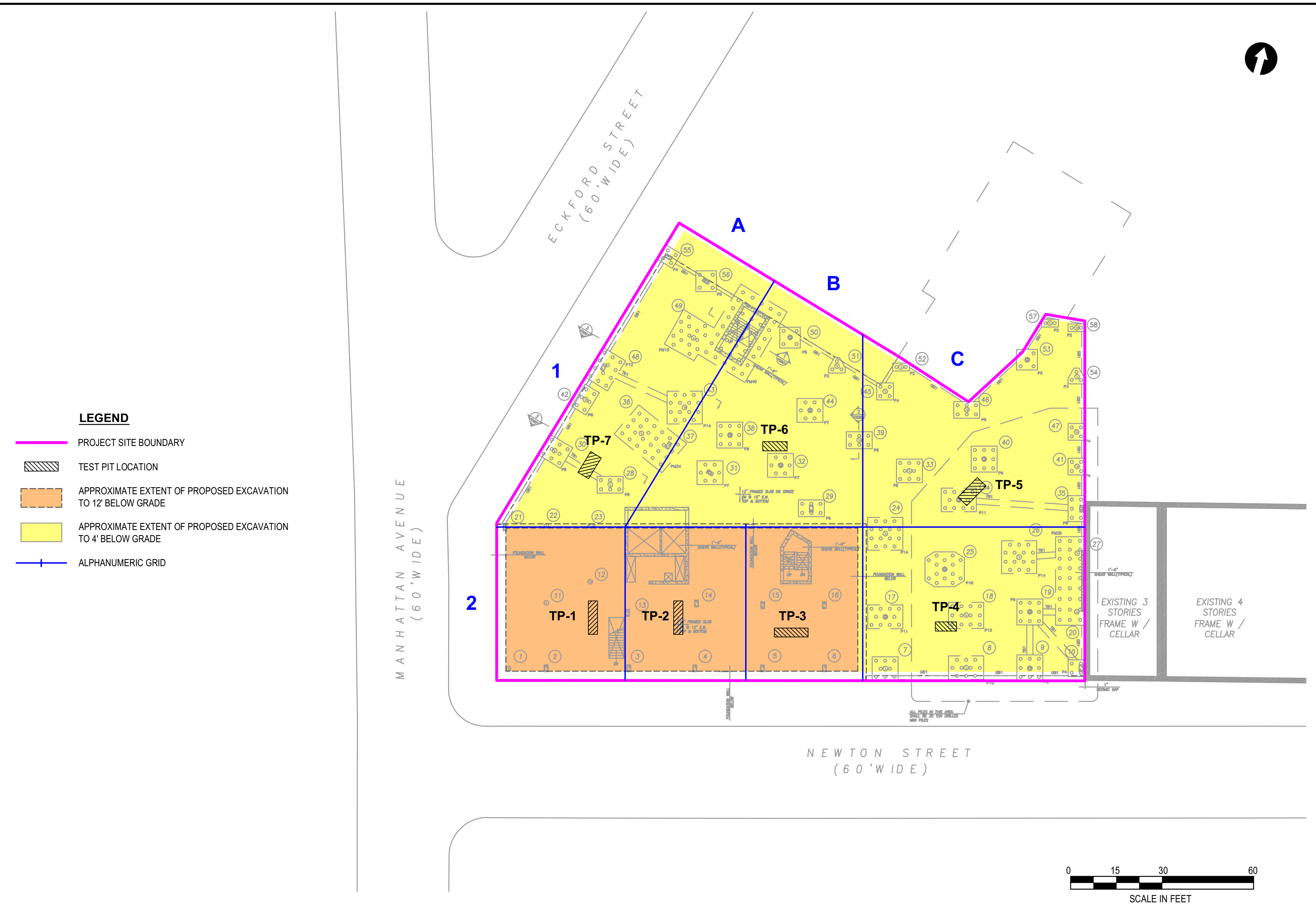
Procedures for test pit oversight and sampling during site investigation activities are described below:

1. Make sure the field crew is wearing appropriate PPE.
2. Calibrate field instruments in accordance with the manufacturer's specifications and record the results in your field notes.
3. If there is a site-specific HASP, conduct a tailgate meeting and have the contractor sign the signature page of the HASP.
4. Select the test pit location. The test pit may need to be moved from the proposed location based on access considerations, utility mark-outs, geophysical survey findings, etc. If relocation is needed, discuss alternate location with the Project Manager.
5. Measure the test pit location (from site boundary or other landmarks, such as building walls) and dimensions, and note the results in the test pit log (see Attachment A). At larger sites, GPS may be used in addition to measurements from site boundaries/landmarks. Regardless, the dimensions of the test pit should always be noted in the test pit log.
6. During excavation, conduct air monitoring with the PID and any other equipment required by the HASP. If a site-specific HASP exists, follow the action levels specified within the document. If no site-specific HASP exists, the generic AKRF HASP specifies upgrading to Level C PPE if PID readings reach 10 parts per million (ppm), and stopping work (until elevated VOC levels dissipate) if readings reach 20 ppm. Note the PID readings in field book and, if required by the site-specific HASP, in an air monitoring log (see SOPs #H-FW-02 and #H-RA-03).
7. During excavation, field-screen the soil using a PID, either by placing a small quantity of soil into a Ziploc bag and inserting the PID probe, or by opening a cavity in the soil being screened and inserting the PID probe into the cavity. [Note: If inserting the PID probe into an open cavity, take care to ensure that the probe is not clogged with soil or exposed to excessive moisture or wet conditions, which will lead to malfunction of, or could damage, the PID.] For test pits, PID reading should be taken to represent the excavated soils (in most situations, PID reading should be taken every vertical foot). Soil for field screening or sample collection should be collected from the bucket of the excavation equipment; pits should not be entered unless it is deemed safe to do so and the entrance is in compliance with OSHA regulations.
8. Observe and log the excavation using the test pit log. Excavated soil should be classified using the modified Burmister system (see SOP #H-SI-02) with boulder counts (i.e., note the number of boulders in each size group specified on the test pit log). Note soil layers (if distinguishable), depth to water (if observed), any evidence of contamination (e.g., odors, staining, and/or elevated PID readings), any evidence of urban fill (e.g., fragments of building materials, ash, coal, wood, and/or ceramics), and any soil/groundwater sample collection. Take photos of the finished test pit from different angles, and of the buckets of material if contamination or unusual conditions are observed.
9. Soil removed from the test pit should be stockpiled adjacent to the excavation on poly sheeting.
10. Maintain a safe distance from the edge of the test pit (approximately 0.5 to 0.75 times the test pit depth). Do not enter, or allow workers to enter, test pits over 5 feet deep unless they have been appropriately supported by shoring or sloping.
11. Soil samples should be collected from the excavator bucket, the stockpile, or a hand auger lowered into the pit. Collect VOC samples promptly to minimize loss by volatilization. Note the approximate

depth interval of sample collection. Discuss the sample naming convention to be used with the Project Manager.

12. If groundwater is noted at the bottom of the test pit, measure the approximate depth (to the nearest 0.1 foot) using a measuring tape or an interface probe. If sample collection is needed, the sample may be collected using a bailer attached to a string.
13. If evidence of contamination and/or USTs is noted, call the Project Manager. Refer to SOP #H-II-04 for tank assessment procedures. Extending the test pit, or advancing additional test pits, may be appropriate.
14. When test pit excavation is complete, replace soil in the excavation unless it is grossly contaminated (e.g., contains petroleum product) or cannot be replaced for another reason (e.g., it is known hazardous waste). If soil cannot be replaced in the excavation, surround the excavation with caution tape or safety fence until it can be backfilled, and either containerize the excavated soil in a labeled drum, or (for short-term storage) cover the stockpiled soil with secured plastic sheeting. The soil should be removed for off-site disposal as soon as possible (see SOP #H-SI-13).
15. Non-dedicated equipment should be decontaminated between borings in accordance with SOP #H-SI-12 and any site-specific HASP or QAPP.
16. Call the Project Manager to notify them of the completion of the work and any significant observations prior to leaving the work site.

ATTACHMENT A:
EXAMPLE FIGURE



AKRF

AKRF Engineering, P.C.
440 Park Avenue South, New York, N.Y. 10016

12 Eckford Street (470 Manhattan Avenue)
Brooklyn, New York

WASTE CLASSIFICATION SAMPLE LOCATIONS

DATE
10/31/2016

PROJECT NO.
12306

FIGURE
2

ATTACHMENT B:
EXAMPLE & TEST PIT LOG TEMPLATE

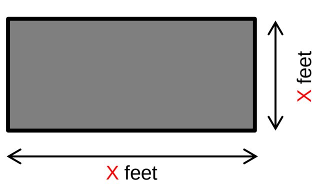
TEST PIT LOG	Site Name Site Address AKRF Project Number: XXXX	Test Pit ID: Sheet 1 of 1	TP- #

AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016

Machine Type:	XXXX	Drilling	
Sampling Method:	XXXX	Start Time: ##:##	Finish Time: ##:##
Operator:	XXXX		
Weather:	XX °F, XX (conditions)	Date: XX/XX/XXXX	
Logged By:	Initial. Last Name, AKRF		

Depth (feet)	% Debris	Surface Condition: XXXXXX	Odor	Moisture	PID (ppm)	NAPL	Boulders	Soil Samples Collected for Laboratory Analysis
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Test Pit Scale Drawing:



NORTH

Test Pit Dimesions:

Length: X feet
Width: X feet
Depth: X feet

Notes: Groundwater Depth Indicator
Soil samples analyzed for X by EPA Method X, ...
Groundwater encountered at approximately X feet below grade during test pit excavation. OR Groundwater not encountered during test pit exc
End of test pit at X feet below grade.

PID = photoionization detector **ppm = parts per million** **NAPL = non-aqueous phase liquid** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

TEST PIT LOG

New 470 Project
12 Eckford Street
Brooklyn, New York
AKRF Project Number: 12306

Test Pit No. **TP-1**
Sheet 1 of 1

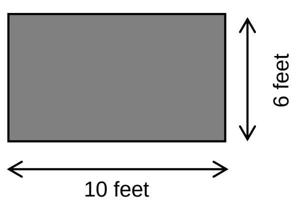
AKRF
440 Park Avenue South, New York, NY 10016
Phone (212) 696-0670 Fax (212) 726-0942

Method: Excavator	
Sampling Method: Test Pit	
Operator: Eastern Environmental	
Sampler: Matthew Levy, AKRF	

Excavating			
Start Time:	8:40	**Finish Time:**	9:15
Date:	10/5/2016		
Weather:	70 °F, Mostly Sunny		

Depth (feet)	**% Debris**	**Surface Condition: FILL**	**Odor**	**Moisture**	**PID (ppm)**	**NAPL**	**Boulders**	**Samples Collected for Lab Analysis**
1	5	Top 18": Light brown SAND, some Silt, trace Brick, Concrete, Gravel (FILL).	ND	Dry	ND	ND	None	TP-1 (0-12) 20161005
2								
3								
4		Bottom 42": Brown SAND, some Silt, trace Brick, Concrete, Gravel (FILL).	ND	Dry	100	ND	None	
5								
6	5	Top 12": Brown SAND, some Silt, trace Brick, fine Concrete, Gravel (FILL).	ND	Dry	300	ND	None	
7	30							
8								
9		Bottom 48": Brown SAND, some Ash, trace Gravel (FILL).	ND	Dry	700	ND	None	
10								
11	5	Dark Brown SAND, some Silt, Organics, trace fine Gravel.	ND	Dry	1,000	ND	None	TP-1 (12) 20161005; TP-1 (12)V 20161005
12								

Test Pit Scale Drawing:



NORTH

Test Pit Dimesions:
Length: 10 feet
Width: 6 feet
Depth: 12 feet

Notes:
End of test pit at 12 feet below grade.
Soil samples analyzed for TCL VOCs by EPA Method 8260.
Groundwater was not encountered.
PID = photoionization detector ppm = parts per million NAPL = non-aqueous phase liquid ND = not detected

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

GROUNDWATER MONITORING WELL INSTALLATION – OVERBURDEN

SOP#: H-SI-05

March 2018

Prepared By:

Name: Patrick Diggins Signature: ______________ Date: 3-1-18

Prepared By:

Name: Bryan Zieroff Signature: ______________ Date: 3-1-18

Approved By:

Name: Marc Godick Signature: ______________ Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: ______________ Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

TABLES

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to properly plan, coordinate, and document the installation of groundwater monitoring wells in overburden. This SOP applies to installation of wells in overburden strata. These instructions are typically applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

Groundwater monitoring well installation creates temporary or permanent access for testing the quality and/or hydrogeologic properties of an aquifer. The aim is to not alter the pre-existing conditions of the aquifer. This SOP can be applied with various drilling methods, including hollow-stem auger, sonic, direct push, mud rotary, and air rotary hammer. A licensed drilling contractor is often required to operate any drilling equipment (see Section 6.0), and AKRF will oversee all activity to confirm proper well construction and log details.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during groundwater monitoring well installation in overburden, as appropriate:

SOP #H-SI-01	Safety/Utility Clearance for Subsurface Investigation
SOP #H-SI-02	Soil Classification and Logging
SOP #H-SI-03	Soil Boring Oversight and Sampling
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- ☐ OSHA Level D PPE
- ☐ Nitrile Gloves
- ☐ Oil/Water Level Indicator & Decontamination Supplies
- ☐ Measuring Tape or Wheel
- ☐ Photoionization Detector (PID) & Calibration Kit
- ☐ Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- ☐ Sampling Jars/Collection Equipment for Contingent Soil or Groundwater Sampling
- ☐ Permanent Marker and Field Book
- ☐ Spray Paint/Marking Flags
- ☐ Drum Labels
- ☐ Other:______________________________

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional using this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Scope of Work (e.g., Phase II Work Plan, RI Work Plan, or proposal)
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Monitoring Well Locations (See Attachment A for a Figure Example)
- Soil Boring/Monitoring Well Logs from previous investigations, if any
- AKRF Monitoring Well Installation Logs (see Attachment B for the Monitoring Well Installation Log Template and a completed example), to be completed during implementation of this SOP
- Related SOPs listed in Section 3.0

6.0 DRILLER MATERIALS

Note in the field book or applicable field form the intended drilling equipment and well construction materials. Confirm necessary equipment has been thoroughly decontaminated. Special attention should be given to the threaded section of the casings and to the drill rods.

*When drilling in jurisdictions that require the driller to be licensed, such as New York State and New Jersey, record the driller's license number. Additionally, if a well permit is required by the jurisdiction, confirm that it has been obtained and record the permit number (this information should have been obtained prior to mobilization to the site).

Fill out and check off the items below to confirm that the driller is properly prepared to complete the intended scope of work:

- Drill Rig (make and model):____
- Schedule (sch.) 40 Polyvinyl Chloride (PVC) Riser Pipe - Diameter:_________
- Sch. 40 Slotted PVC Screen Pipe - Diameter: _________ Slot Size: _________
- Threaded PVC Cap for Well Bottom
- Gripper Plug for Sealing Top of Well
- 55-gallon DOT-Approved Drums

For Permanent Groundwater Monitoring Wells Only:

- Lock and Key
- Clean Silica Sand. Grain Size:_________
- Bentonite-Cement Grout
- Bentonite Seal
- Concrete
- Flush-mount Manhole or Stick-up Protective Cover (**circle one**)

If soil borings were previously performed and AKRF has access to the boring and well construction logs, the monitoring well depth, sch. 40 PVC screen slot size, and clean silica sand grain size (a.k.a. filter pack) should be estimated/determined prior to mobilization. If records are not available, the well depth should be recorded in field notes and/or on the well sampling log. Applicable well construction materials and specifications should be confirmed based on field observations.

The following table identifies compatible sch. 40 PVC screen slot size and clean silica sand grain size based on the classified soil lithology.

TABLE 1 – SCREEN SLOT SIZE

Soil Lithology	Screen Slot Size (inches)	Clean Silica Sand Grain Size (Filter Pack)
Clay and Silt	0.01	No. 1 or No. 2
Silt and Sand (Default)	0.02	No. 1, No. 2, or No. 3
Sand and Gravel	0.03	No. 2 or No. 3

The driller should be contacted in advance of mobilization to ensure that they have these materials available on site.

7.0 ON-SITE PREPARATION

Prior to drilling, confirm adequate clearance from mark-out and/or known/identified underground utilities listed on Table 1, then lead a tailgate health and safety meeting stating the anticipated scope for each day of work. Note in the field book or applicable field form the location of marked-out underground utilities and overhead electrical lines with the driller and on-site representatives (if applicable) before beginning any work. Please note, sewers are often not marked out and utilities are not usually marked out on private property. Include a discussion about unmarked utilities in the tailgate safety meeting.

TABLE 2 – UNDERGROUND UTILITY CHECKLIST

Identified	Underground Utilities
☐	Electric (Red)
☐	Gas/Oil (Yellow)
☐	Potable Water (Blue)
☐	Communications (Orange)
☐	Sewer (Green)
☐	Other:________________

8.0 PERMANENT GROUNDWATER MONITORING WELL INSTALLATION PROCEDURES

A soil boring should be advanced first to the proposed permanent groundwater monitoring well depth (see SOP # H-SI-03, Soil Boring Oversight and Sampling).

The AKRF Field Professional is responsible for the following:

1. Use the soil boring data (water table depth and lithology) to determine the monitoring well construction specifications. Table 3 presents examples of observed water table depth and typical installation parameters. For reference, typical flush-mount and stick-up monitoring well construction diagrams are shown in Attachment C.

TABLE 3 – EXAMPLE PERMANENT WELL CONSTRUCTION SPECIFICATIONS

Observed Water Table Interface Depth	Groundwater Monitoring Well Depth	Screened Interval	Filter Pack Interval	Bentonite Seal Interval	Bentonite-Cement Grout Interval
5	13	3-13	1.5-13	0.5-1.5	NA
10	17	7-17	5-17	3-5	0.5-3
12	19	9-19	7-19	5-7	0.5-5
20	27	17-27	15-27	13-15	0.5-13
30	37	27-37	25-37	23-25	0.5-23

– All numerical measurements are in feet below ground surface.
– If a shallow groundwater table interface is observed, the specifications may need to be modified (as shown for a groundwater table interface of 5 and 10 feet below ground surface).
– The typical construction specifications may be modified to address project specific conditions (soil lithology, evidence of contamination, contaminant type, etc.).

2. Instruct the driller to create a borehole at the soil boring location to the determined well depth. The borehole must be wide enough to construct the specified well diameter (generally triple the proposed groundwater monitoring well PVC diameter).

   Instruct the driller to place the sch. 40 PVC slotted screen at the bottom of the borehole, with a PVC cap attached to the bottom. The sch. 40 PVC riser will be threaded (no glue to be used) on top of the sch. 40 PVC slotted screen. Refer to Table 1 in Section 6.0 of this SOP for assistance identifying compatible clean silica sand grain size and sch. 40 PVC screen slot size.

   In determining the length of screen that will be located below and above the water table interface, the elevation of the seasonal water table will be considered. The well screen will be situated a minimum of 3 to 5 feet above the observed water table interface (assuming the area is not tidally influenced), to ensure that the top of the water table is captured within the screened interval, and approximately 5 to 7 feet below the water table, to provide sufficient water in the well for sampling at all times and to avoid sample collection close to the bottom of the well.

3. Instruct the driller to place a gripper plug within the top of the sch. 40 PVC riser to prevent anything from entering the well column from the surface.
4. Instruct the driller to pour clean silica sand from sealed bags, to serve as a filter pack, around the sch. 40 slotted screen to a depth of 2 feet above the top of the screen.
5. Instruct the driller to pour a bentonite seal (pellets or chips) on top of the filter pack to a depth of 2 feet above the filter pack. Instruct the driller to hydrate the bentonite with water prior to backfilling on top of it.
6. If minimal depth remains (less than 10 feet), instruct the driller to backfill to 0.5 feet below grade with either silica sand or site material that does not exhibit evidence of contamination. If adequate depth remains (greater than 10 feet), instruct the driller to backfill the remainder of the annular space using bentonite-cement grout to about 0.5 feet below grade.

   For deeper installations (approximately 50 feet or greater), the clean silica sand, bentonite seal, and bentonite-cement grout should be installed using a tremie pipe. Potable water can be used with the clean silica sand and pumped through the tremie pipe. Allowance must be made for settlement of the clean silica sand.

7. Instruct the driller to construct a concrete pad around a protective cover (flush-mount manhole or stick-up pipe). The pad should be square, at least 1.5 by 1.5 feet, and sloped slightly away from the

manhole lid to divert runoff. Groundwater monitoring wells generally should be completed using flush-to-grade (flush-mount) manholes. In some cases, a stick-up completion may be desired (usually in vegetated areas).

8. Use a permanent marker to draw a thick line on the north side of the sch-40 PVC riser lip – to indicate the point to use as "Top of Casing" when surveying and when measuring depth to water or total depth of the well.
9. Measure and record the depth to water and the depth of the well immediately following completion of the manhole/stick-up protective cover.
10. Instruct the driller to place a lock on the gripper plug for flush-mount completions and on the protective steel casing for stick-up completions.
11. Document well installation specifications (measured location from site features, depth, construction details, and groundwater level measurements) in the field book or on field data sheets.
12. Instruct the driller to decontaminate the augers and/or rods between each well installation.
13. Instruct the driller to bag up all trash (including gloves and PVC trimmings) and drum soil cuttings if visibly contaminated or if the scope prohibits their reuse on site. Label any generated drums with the well ID, date, site name, and contents. If contaminated, consult the AKRF Project Manager for any additional requirements (e.,g. location or security). Document the location and details of the investigation derived waste that has been drummed in the field book, and take a photograph to confirm status prior to leaving the site.

9.0 TEMPORARY GROUNDWATER MONITORING WELL INSTALLATION PROCEDURES

Note – The following procedures assume that the temporary well is not a "pre-pack" well

A soil boring should be advanced first to the proposed temporary monitoring well depth (see SOP # H-SI-03, Soil Boring Oversight and Sampling).

The AKRF Field Professional is responsible for the following:

1. Use the soil boring data (water table depth) to determine the temporary monitoring well construction specifications. Table 4 presents examples of observed groundwater table depth in feet below ground surface, and typical installation parameters that would be applied to achieve proper construction to allow for groundwater sample collection. A typical temporary groundwater monitoring well construction diagram is shown in Attachment D..

TABLE 4 – EXAMPLE TEMPORARY WELL CONSTRUCTION SPECIFICATIONS

Observed Water Table Interface Depth	Groundwater Monitoring Well Depth	Screened Interval
5	12	2-12
10	17	7-17
12	19	9-19
20	27	17-27
30	37	27-37

– All numerical measurements are in feet below ground surface.
– If a shallow water table interface is observed, the specifications may need to be modified (as shown for a groundwater table interface of 5 feet below ground surface).
– The typical construction specifications may be modified to address project specific conditions (soil lithology, evidence of contamination, etc.).

2. Instruct the driller to place the sch. 40 PVC slotted screen at the bottom of the borehole with a PVC cap attached to the bottom. The sch. 40 PVC riser will be threaded (not glued) on top of the sch. 40 PVC slotted screen.

   The well screen will be situated approximately 3 feet above the observed water table interface (assuming the area is not tidally influenced), to ensure that the water table is captured within the screened interval, and approximately 7 feet below the water table, to provide sufficient water in the well for sampling at all times and to avoid sample collection close to the bottom of the well.

2. Instruct the driller to place a gripper plug within the top of the sch. 40 PVC riser to prevent anything from entering the well column from the surface.
3. Instruct the driller to pour clean silica sand from sealed bags to fill the annular space around the sch. 40 PVC (if any), to serve as a filter pack.
4. Measure and record the depth to water and the depth of the well.
5. Document well installation specifications (measured location, depth, construction details, and groundwater level measurements) in the field book or on field data sheets.
6. Instruct the driller to decontaminate the rods/drilling equipment between each well installation.
7. Instruct the driller to bag up all trash (including gloves and PVC trimmings) and drum soil cuttings (if any). Label any generated drums with the well ID, date, site name, and contents. Document the location and details of the investigation derived waste that has been drummed in the field book, and take a photograph to confirm status prior to leaving the site.
8. Repeat steps two through eight for subsequent temporary wells at the same site that are screened at the same interval.

10.0 WELL DEVELOPMENT PROCEDURES

A newly completed monitoring well should not be developed for at least 24 hours after the surface pad and outer protective casing are installed. This will allow sufficient time for the well materials to cure. The main purpose of developing wells is to remove the residual materials from installation, and to try to re-establish the natural hydraulic flow conditions of the formations which may have been disturbed by well construction (refer to SOP #H-SI-07 for well development procedures).

11.0 INVESTIGATION DERIVED WASTE (IDW)

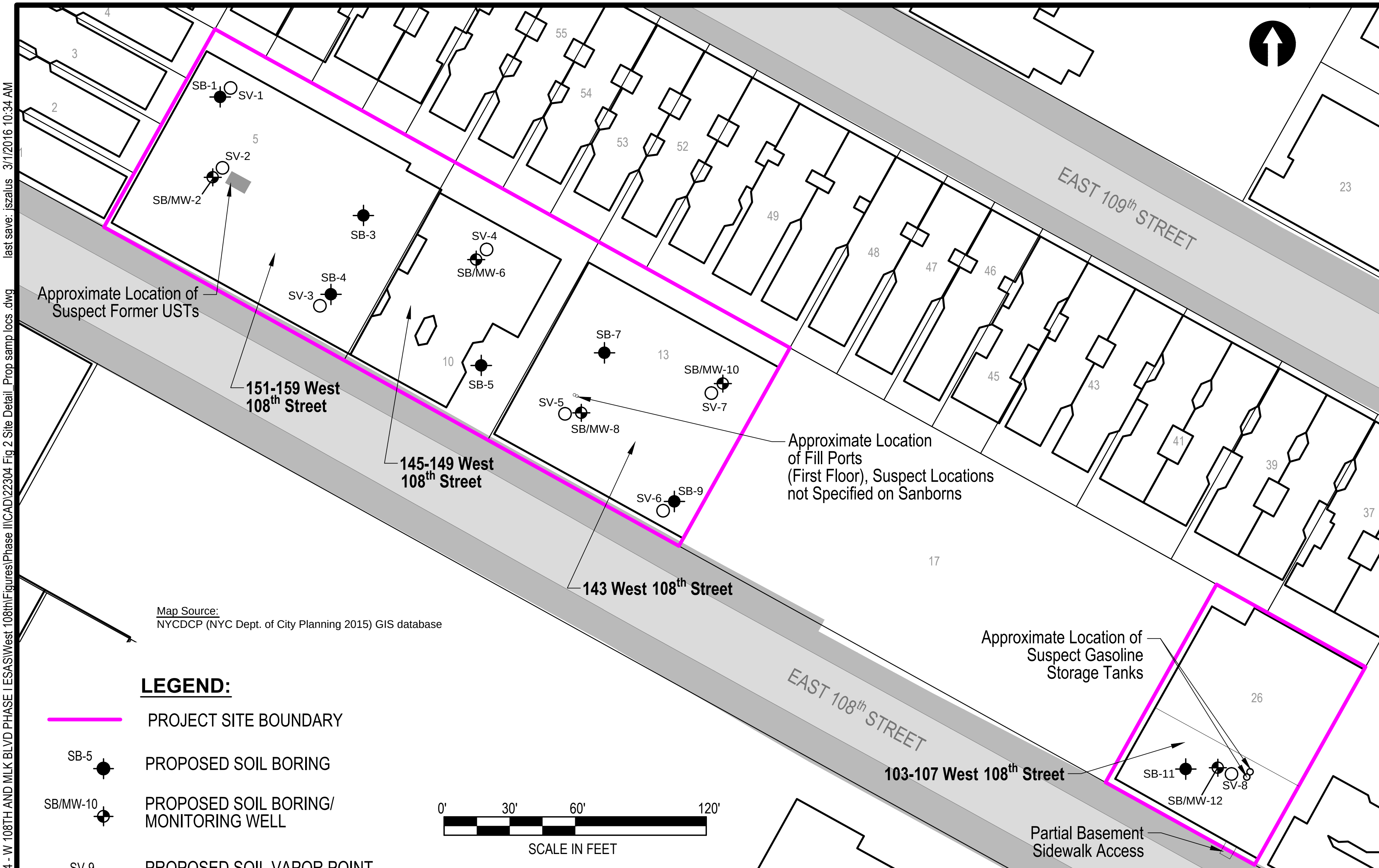
IDW must be handled in a particular manner to protect human health and the environment and to be compliant with applicable rules and regulations. Contaminated soil and groundwater should be containerized in Department of Transportation (DOT)-approved 55-gallon drums and labeled accordingly (pending sampling results). Grossly contaminated personal protective equipment (PPE) should also be containerized in 55-gallon drums. When handling IDW, AKRF employees should follow any protocols set forth in SOP #H-SI-13, Investigation Derived Waste.

12.0 REFERENCES

1. U.S. Environmental Protection Agency – Science and Ecosystem Support Division – Design and Installation of Monitoring Wells – February 2008.

3. USEPA – Monitoring Well Installation SOP#2048 – March 1996.

ATTACHMENT A:
EXAMPLE FIGURE



103-107 and 143-159 West 108th Street

New York, New York

PROJECT SITE DETAIL AND PROPOSED SAMPLING LOCATIONS

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

DATE	3/1/2016
PROJECT No.	22304
SCALE	as shown
FIGURE	2

ATTACHMENT B:
EXAMPLE & MONITORING WELL INSTALLATION LOG TEMPLATE

SOIL BORING AND WELL INSTALLATION LOG	Site Name Site Address AKRF Project Number: XXXXX	Groundwater Monitoring Well ID: Sheet 1 of 2	GW/TW/MW-#	Soil Boring ID:	SB-#

AKRF 440 Park Avenue South, 7th Floor New York, NY 10016			
Drilling Method:	XXXX	Drilling	
Sampling Method:	XXXX	Start Time: ##:##	Finish Time: ##:##
Driller:	XXXX		
Weather:	XX °F, XX (conditions)	Date: XX/XX/XXXX	
Logged by:	Initial. Last Name, AKRF		

Depth (feet)	Well Construction	Surface Condition: XXXX	Recovery (Inches)	Soil Boring Log	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
1		Flush-mounted well cover, locking j-plug, and concrete seal: grade to X' below grade.							
2		Non-shrinking cement grout: X' to X' below grade.							
3		2" diameter PVC well casing: X' to X' below grade							
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

Notes: ▼ **Groundwater Depth Indicator**

Groundwater measured at XX feet below grade in [GW Monitoring Well ID #] on [Month, Date, Year].

Groundwater monitoring well installed to X feet below grade.

Soil samples analyzed for X by EPA Method X, …..

Groundwater encountered at approximately X feet below grade during soil boring installation OR Groundwater not encountered during soil boring installation.

End of soil boring at X feet below grade.

PID = photoionization detector **NAPL = non-aqueous phase liquid** **ppm = parts per million** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING AND WELL INSTALLATION LOG	Site Name Site Address AKRF Project Number: XXXXX	Groundwater Monitoring Well ID: Sheet 2 of 2	GW/TW/MW-#	Soil Boring ID:	SB-#

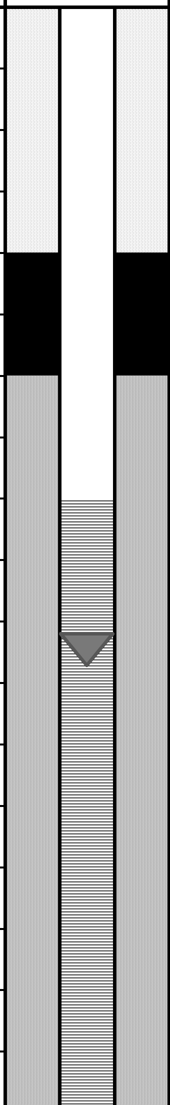
AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016

Drilling Method:	XXXX
Sampling Method:	XXXX
Driller:	XXXX
Weather:	XX °F, XX (conditions)
Logged by:	Initial. Last Name, AKRF

Drilling

Start Time: ##:##	Finish Time: ##:##
Date: XX/XX/XXXX	

Depth (feet)	Well Construction	Surface Condition: XXXX	Recovery (Inches)	Soil Boring Log	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
21		Non-shrinking cement grout: X' to X' below grade							
22		2" diameter PVC well casing: X' to X' below grade							
23									
24									
25		Bentonite seal: X' to X' below grade							
26									
27									
28									
29		0.020-inch slotted PVC well screen: X' to X' below grade							
30									
31		No. 2 morie sandpack filter: X' to X' below grade							
32									
33									
34									
35									
36									
37									
38		End cap: X' below grade							
39									
40									



Notes: ▼ Groundwater Depth Indicator
Groundwater measured at XX feet below grade in [GW Monitoring Well ID #] on [Month, Date, Year].
Groundwater monitoring well installed to X feet below grade.

Soil samples analyzed for X by EPA Method X, …..
Groundwater encountered at approximately X feet below grade during soil boring installation OR Groundwater not encountered during soil boring installation.
End of soil boring at X feet below grade.

PID = photoionization detector NAPL = non-aqueous phase liquid ppm = parts per million ND = not detected

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING AND WELL INSTALLATION LOG	Atlantic Chestnut - Lot 3 275 Chestnut Street, Brooklyn, NY AKRF Project Number: 12184	Groundwater Monitoring Well ID: Sheet 1 of 2	L3-SRI-MW-11S	Soil Boring ID:	L3-SRI-SB-11

AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016

Drilling Method:	Rotosonic
Sampling Method:	5' Plastic Sleeve
Driller:	Aarco Environmental
Weather:	38 °F, Sunny
Logged by:	E. Matamoros, AKRF

Drilling

Start Time: 11:30 | **Finish Time: 12:30**

Date: 11/10/17

Surface Condition:

Flush-mounted well cover and locking j-plug

2-inch Ø PVC well casing: grade to 25' below grade.

Non-shrinking cement grout: grade to 21' below grade.

Depth (feet)	Recovery (Inches)	Soil Boring Log	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
0-5	33	Top 18": Brown SILT and SAND, some Concrete, Asphalt (FILL).	ND	Dry	ND	ND	
		Bottom 15": Brown SILT, little Sand, Concrete (FILL).	ND	Dry	ND	ND	L3-SRI-SB-11 (4-5) 20171110
5-10	24	Brown SAND, some Gravel, Silt (FILL).	ND	Dry	ND	ND	
10-15	42	Brown SAND, some Silt, little Concrete (FILL).	ND	Dry	ND	ND	L3-SRI-SB-11 (13-15) 20171110
15-20	32	Brown SAND, some Silt, little Concrete (FILL).	ND	Dry	ND	ND	

Notes: ▼ Groundwater Depth Indicator

Stabilized groundwater measured at 29.60 feet below grade in L3-SRI-MW-11S on 12/12/2017.

Groundwater monitoring well installed to 35 feet below grade.

Soil samples analyzed for CVOCs by EPA Method 8260.

Groundwater encountered at approximately 26 feet below grade during soil boring advancement.

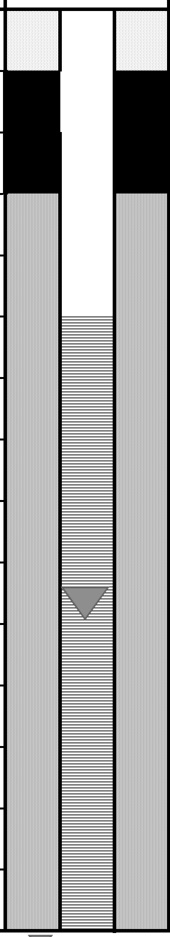
End of soil boring at 35 feet below grade.

PID = photoionization detector **NAPL = non-aqueous phase liquid** **ppm = parts per million** **ND = not detected**

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

SOIL BORING AND WELL INSTALLATION LOG	Atlantic Chestnut - Lot 3 275 Chestnut Street, Brooklyn, NY	Groundwater Monitoring Well ID:	L3-SRI-MW-11S	Soil Boring ID:	L3-SRI-SB-11
	AKRF Project Number: 12184	Sheet 2 of 2			

AKRF 440 Park Avenue South, 7th Floor New York, NY 10016		
Drilling Method:	Rotosonic	Drilling
Sampling Method:	5' Plastic Sleeve	Start Time: 11:30 — Finish Time: 12:30
Driller:	Aarco Environmental	
Weather:	38 °F, Sunny	Date: 11/10/17
Logged by:	E. Matamoros, AKRF	



Depth (feet)	Well Construction	Surface Condition:	Recovery (Inches)	Soil Boring Log	Odor	Moisture	PID (ppm)	NAPL	Soil Samples Collected for Laboratory Analysis
21		**Non-shrinking cement grout: grade to 21' below grade.**							
22		**2-inch Ø PVC well casing: grade to 25' below grade.**							
23		**Bentonite seal: 21' to 23' below grade.**	28	Brown SAND, some Gravel.	ND	Dry	ND	ND	
24		**No. 2 morie sandpack filter: 23' to 35' below grade.**							
25									
26									
27		**2-inch Ø 0.020-inch slotted PVC well screen: 25' to 35' below grade.**							
28			35	Brown SAND, some Gravel.	ND	Wet @ 26'	ND	ND	
29									
30									
31									
32									
33			38	Brown SAND.	ND	Wet	ND	ND	
34									
35		**End cap: 35' below grade**							

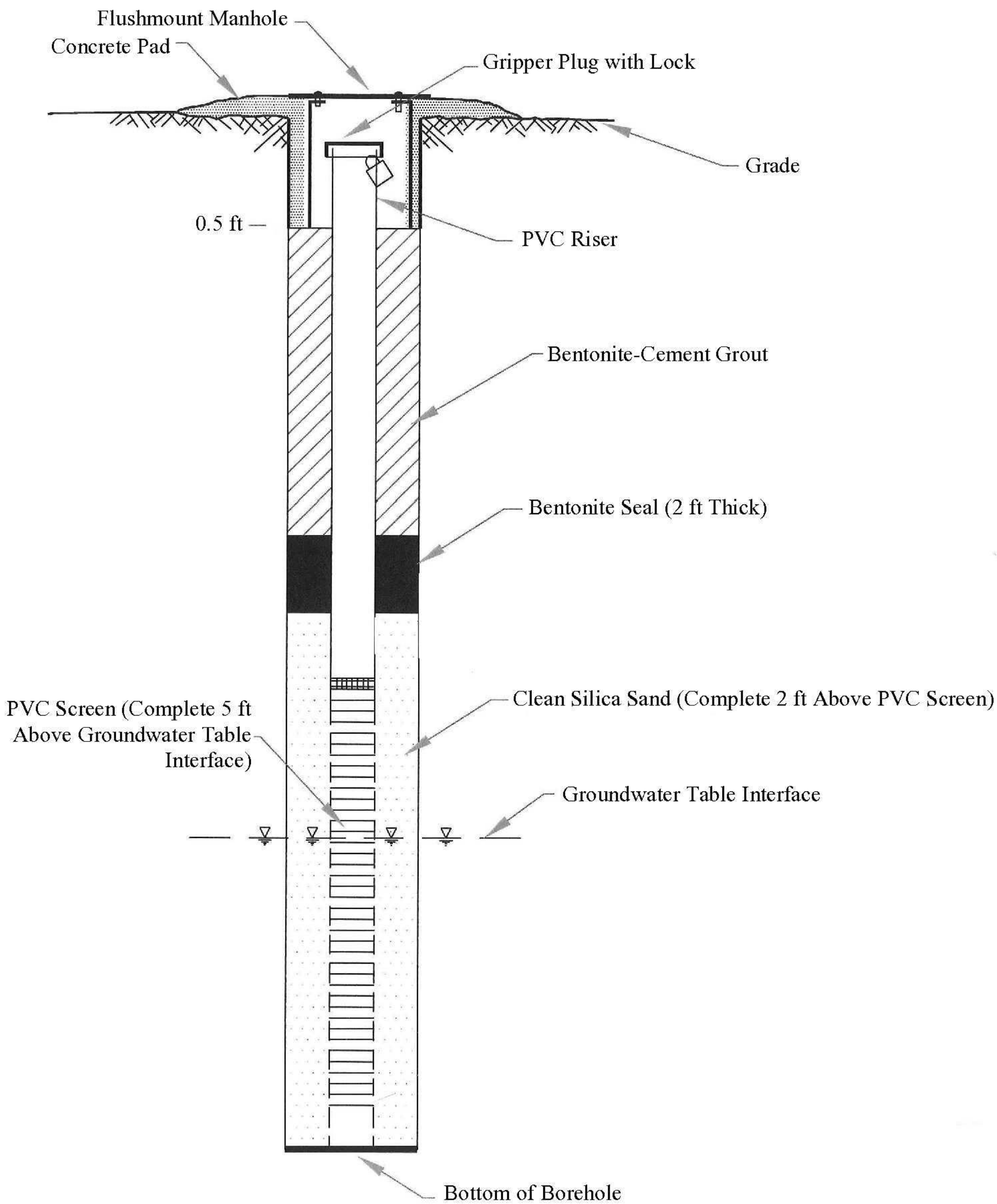
Notes: ▼ Groundwater Depth Indicator
Stabilized groundwater measured at 29.60 feet below grade in L3-SRI-MW-11S on December 12, 2017.
Groundwater monitoring well installed to 35 feet below grade.

Soil samples analyzed for CVOCs by EPA Method 8260.
Groundwater encountered at approximately 26 feet below grade during soil boring advancement.
End of soil boring at 35 feet below grade.

PID = photoionization detector **NAPL = non-aqueous phase liquid** **ppm = parts per million** **ND = not detected**

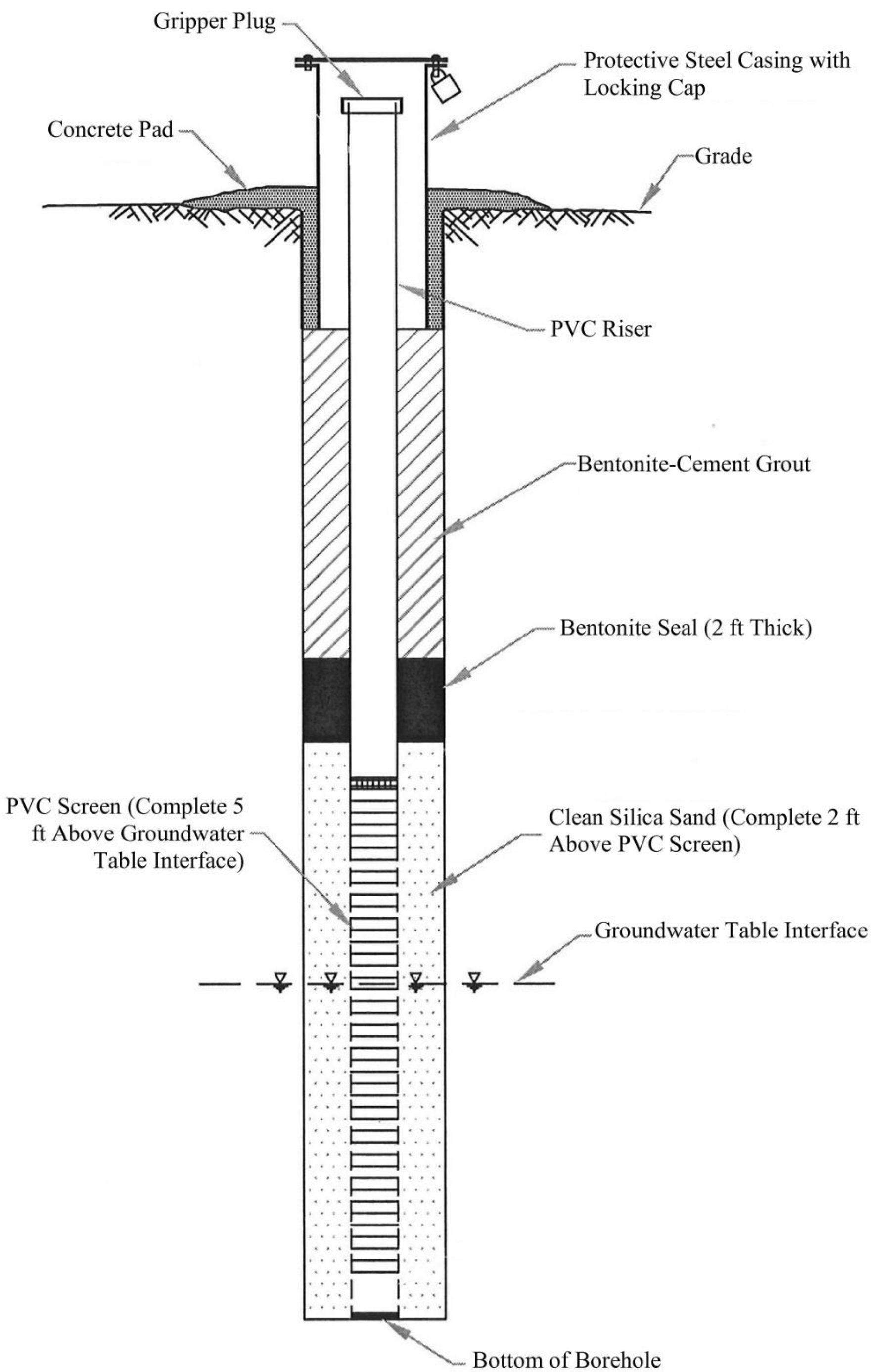
Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

ATTACHMENT C:
PERMANENT GROUNDWATER MONITORING WELL DIAGRAMS



TYPICAL MONITOR WELL CONSTRUCTION (FLUSH MOUNTED WELL CAP)

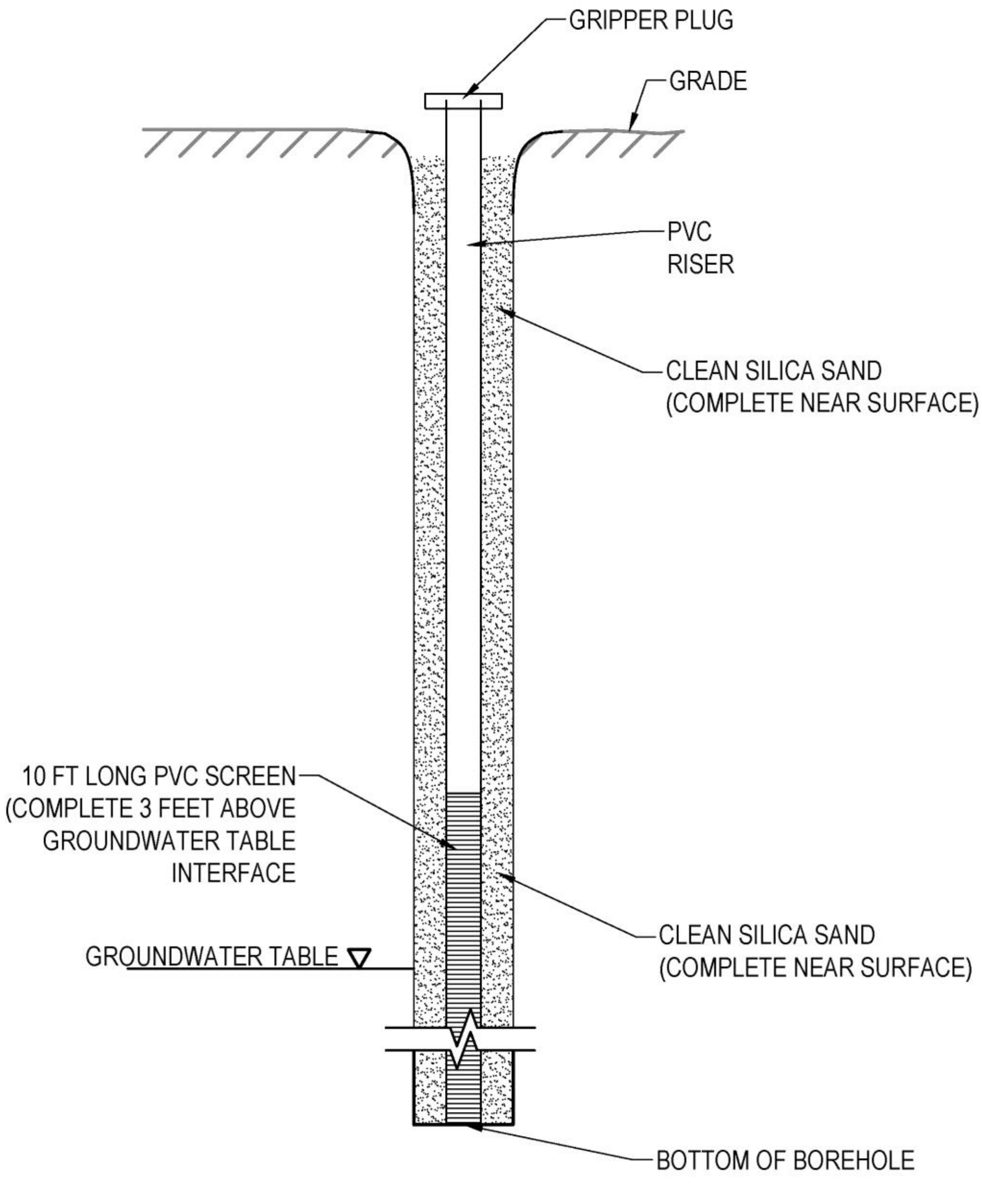
NOT TO SCALE



TYPICAL MONITOR WELL CONSTRUCTION (STICK-UP COMPLETION WITH PROTECTIVE STEEL CASING)

NOT TO SCALE

ATTACHMENT D:
TEMPORARY GROUNDWATER MONITORING WELL DIAGRAM



TYPICAL TEMPORARY MONITOR WELL CONSTRUCTION

NOT TO SCALE

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

GROUNDWATER MONITORING WELL INSTALLATION – BEDROCK

SOP#: H-SI-06

March 2018

Prepared By:

Name: Steve Grens Signature: ________ Date: 3-1-18

Prepared By:

Name: Bryan Zieroff Signature: ________ Date: 3-1-18

Approved By:

Name: Marc Godick Signature: ________ Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: ________ Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

TABLES

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to properly plan, coordinate, and document the installation of groundwater monitoring wells in bedrock. These instructions are typically applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

Groundwater monitoring well installation in bedrock creates permanent access for testing quality and/or hydrogeologic properties of a bedrock aquifer. During the installation of bedrock monitoring wells, rock cores may be collected for determining Rock Quality Designation (RQD), which provides a general indication of rock mass quality, fracture zones that create a pathway for contaminant migration, and rock competency, which is used for structural engineering purposes. A licensed drilling contractor is often required to operate any drilling equipment, and AKRF will oversee all activity to confirm proper well construction and log details.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during groundwater monitoring well installation in bedrock, as appropriate:

SOP #H-SI-01	Safety/Utility Clearance for Subsurface Investigation
SOP #H-SI-02	Soil Classification and Logging
SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- ☐ OSHA Level D PPE
- ☐ Nitrile Gloves
- ☐ Oil/Water Level Indicator & Decontamination Supplies
- ☐ Measuring Tape or Wheel
- ☐ Photoionization Detector (PID) & Calibration Kit
- ☐ Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- ☐ Sampling Jars/Collection Equipment for Contingent Soil or Groundwater Sampling
- ☐ Permanent Marker and Field Book
- ☐ Spray Paint/Marking Flags
- ☐ Rock Core Sample Box (Confirm Drillers Providing Sample Box)
- ☐ Drum Labels
- ☐ Other:______________________________

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional using this SOP:

- ☐ AKRF Company-wide and/or Site-specific HASP
- ☐ AKRF Site-specific Scope of Work (e.g., Phase II Work Plan, RI Work Plan, or proposal)
- ☐ Scaled Figures/Maps/Drawings showing Proposed and/or Existing Boring and/or Monitoring Well Locations (See Attachment A for a Figure Example)
- ☐ Soil Boring/Monitoring Well/Rock Core Logs (Field Logs) from previous investigations, if any
- ☐ AKRF Bedrock Well Installation Logs (see Attachment B for the Bedrock Well Installation Log Template and a completed example), to be completed during implementation of this SOP
- ☐ AKRF Rock Core Evaluation Logs (see Attachment C for the Rock Core Evaluation Log Template and a completed example), to be completed during implementation of this SOP
- ☐ Related SOPs listed in Section 3.0

6.0 DRILLER MATERIALS

Note in the field book or applicable field form the intended drilling equipment and well construction materials. Confirm necessary equipment has been thoroughly decontaminated. Special attention should be given to the threaded section of the casings and to the drill rods.

*When drilling in jurisdictions that require the driller to be licensed, such as New York State and New Jersey, record the driller's license number. Additionally, if a well permit is required by the jurisdiction, confirm it has been obtained and record the permit number (this information should have been obtained prior to mobilization to the site).

Fill out and check off the items below to confirm that the driller is properly prepared to complete the intended scope of work:

- ☐ Drill Rig (make and model): ____
- ☐ Drill Casing
- ☐ Roller Cone Bit
- ☐ Schedule (sch.) 40 Polyvinyl Chloride (PVC) Riser Pipe - Diameter:_________
- ☐ Sch. 40 Slotted PVC Screen Pipe - Diameter: _________ Slot Size: _________
- ☐ Threaded PVC Cap for Well Bottom
- ☐ Gripper Plug for Sealing Top of Well
- ☐ Rock Core Box
- ☐ 55-gallon DOT-Approved Drums
- ☐ Clean Water for Rock Coring

For Permanent Groundwater Monitoring Wells Only:

- ☐ Lock and Key
- ☐ Clean Silica Sand - Grain Size:_________
- ☐ Bentonite-Cement Grout
- ☐ Bentonite Seal
- ☐ Concrete
- ☐ Flush-mount Manhole or Stick-up Protective Cover (**circle one**)

7.0 ON-SITE PREPARATION

Prior to drilling, confirm adequate clearance from mark-out and/or known/identified underground utilities listed on Table 1, then lead a tailgate health and safety meeting stating the anticipated scope for each day of work. Note in the field book or applicable field form the location of marked-out underground utilities and overhead electrical lines with the driller and on-site representatives (if applicable) before beginning any work. Please note, sewers are often not marked out and utilities are not usually marked out on private property. Include a discussion about unmarked utilities in the tailgate safety meeting.

TABLE 1 – UNDERGROUND UTILITY CHECKLIST

Identified	Underground Utilities
☐	Electric (Red)
☐	Gas/Oil (Yellow)
☐	Potable Water (Blue)
☐	Communications (Orange)
☐	Sewer (Green)
☐	Other:________________

8.0 BEDROCK MONITORING WELL TYPES

There are three types of groundwater monitoring wells installed in bedrock.

8.1 Open Hole Bedrock Monitoring Well

The first method is to drill a borehole through the soil overburden to the bedrock surface. An outer steel casing is then installed into the borehole and grout is sealed into the bedrock surface. After the grout has set, the borehole is advanced through the steel casing into the bedrock. When the drilling is complete, the finished well will consist of an open borehole from the ground surface to the bottom of the well. There is no inner casing, and the outer surface casing, installed down into bedrock, extends to or above the ground surface, and also serves as the outer protective casing.

Open hole bedrock wells are typically used for potable water supply to allow for hydrofracking and maximizing the water yield. A limitation to the open rock well is that water bearing fractures cannot be isolated and the entire saturated column serves as the groundwater monitoring zone. In this situation, it is very difficult or even impossible to monitor a specific zone because the type and concentration of contaminants fully dilute into the open borehole. The installation of open bedrock wells is generally not acceptable at contaminated sites, especially sites in State or Federal cleanup programs, because of the uncontrolled monitoring intervals and the potential for cross contamination between water depths.

8.2 Single Cased Bedrock Monitoring Well

This well installation method also gives the flexibility of selecting the screen depth to isolate a monitoring zone(s) and minimizing the mixing of water from different water bearing fractures that were intercepted by the borehole. In addition, the sand pack gives structural integrity to the well, especially in unstable areas (steeply dipping shales, etc.) where the bedrock has a tendency to shift, move, or deteriorate when disturbed.

8.3 Double Cased Bedrock Monitoring Well

The second method of installing a monitoring well into bedrock begins with drilling a borehole, installing an outer steel casing into competent bedrock, and drilling further into bedrock as described above in Section 8.1. The well is then constructed by inserting PVC well materials down into the bedrock through the protective casing to the designated interval, with the PVC well screen, sand filter pack, bentonite seal, and annular grout seal being installed below the competent bedrock interface. The well is then generally completed with a surface protective casing and concrete pad.

Installing the PVC well casing within the steel casing (double cased well) provides for a second level of protection from overburden groundwater migrating into bedrock through the borehole.

9.0 DRILLING METHODS

Drilling into bedrock can be achieved by using an air rotary rig equipped with a percussion hammer, advancing a core barrel using a sonic drilling rig, or by using a standard rotary rig to advance a core barrel into bedrock. Reaching bedrock with a standard rotary rig is achieved by advancing hollow-stem augers, or using the water or mud rotary drilling method with a roller bit. As described in Section 8.0, each method uses a steel casing to seal off the overburden during bedrock drilling.

9.1 Air Rotary

Air rotary drilling is typically used for potable water supply wells, and uses a large percussion hammer to advance the boring with high pressure air being used to lift the pulverized cuttings to the surface. The rig comes equipped with an air compressor to lift the cuttings and groundwater from significant depths to the surface. The rig is designed to drive the outer steel casing in conjunction with the percussion hammer drill stem to reach the bedrock surface. The hammer can rapidly penetrate all forms of bedrock (soft or dense).

Air rotary drilling is not always the preferred method for contaminated sites, as discrete soil samples cannot be collected and contaminated cuttings exiting the borehole can be difficult to control. However, discrete soil sample collection can be achieved using the dual-tube reverse circulation method where cuttings are carried to the surface inside dual-wall drill pipe and separated with a cyclone. An air diverter with a hose or pipe carrying cuttings to a waste container is also an acceptable alternative. Allowing cuttings to blow uncontrolled from the borehole is never acceptable.

9.2 Rock Coring

The preferred method of advancing the borehole into bedrock is called rock coring, using either a Sonic drilling rig, or, a standard rotary rig to advance hollow stem augers, or a roller bit with steel casing.

<u>Rock Coring Via Sonic Drilling</u>

- Uses high frequency resonant energy to advance override casing and a core barrel to allow for continuous soil sampling.
- Uses an override casing drilled with the core barrel that creates a double cased drilling environment in overburden soil to minimize contaminant migration.
- Can drill through difficult overburden conditions, including dense clays and boulders, and even through soft bedrock.

- Has limited capability in dense bedrock.
- Doesn't use drilling fluids.

Rock Coring Via Rotary Drilling

The hollow stem auger (has) method is typically used at contaminated sites for bedrock drilling as part of a wider scope of overburden sampling and well installation. Typically, when depth to bedrock is shallow or the overburden aquifer is limited, steel casing can be spun down to bedrock after removing the augers. In most situations, a rotary drilling method is used to advance steel casing down to the bedrock surface after removing the augers, or even in a separate borehole altogether.

Rotary drilling methods consist of a drill pipe or drill stem coupled to a drilling bit that rotates and cuts through the soils to reach the bedrock interface. The cuttings produced from the rotation of the drilling bit are transported to the surface by the drilling fluids, which are forced down through the drill pipe and out through the bottom of the drilling bit. The cuttings are then lifted to the surface between the borehole wall and the drill pipe. The drilling fluid provides a hydrostatic pressure that reduces or prevents borehole collapse as the casing is spun down to bedrock. In situations where water is unable to keep the borehole open (e.g., deep wells with heaving sands or high hydrostatic pressure), mud rotary is often needed to reach the bedrock surface. Mud rotary uses bentonite mixed with water to create a mud solution. The circulating mud cleans out the drill cuttings during advancement of the roller bit, but also uses its cohesive nature to hold the borehole open and prevent borehole collapse or heaving sands.

When considering this method, it is important to evaluate the potential for contamination when fluids and/or air are introduced into the borehole. Water and mud rotary methods also present the possibility of trace contamination of halogenated compounds when municipal water supplies are used as a potable water source. Unless contaminated formations are cased off, the circulation of drilling fluids present a danger of cross contamination between formations. In any of the rotary (or Sonic) methods, care must be exercised in the selection and use of lubricants to prevent galling (adhesive wear) of drill stem threads.

After reaching the bedrock interface, the steel casing is spun down until it is seated into competent bedrock. The United States Environmental Protection Agency (USEPA) suggests that casing should be advanced a minimum of 1 foot into competent rock. The casing is then flushed of all drill cuttings and a grout seal is added via tremie pipe through the casing to the bedrock interface. After curing a minimum of 24 hours, a core barrel with a cutting shoe, typically 5 feet in length, is attached to the rotary rig and used to advance through the grout seal and into bedrock. Rock coring makes a smooth, round hole into the bedrock without cracking and/or shattering the grout seal, and can retrieve the core section sample to determine rock type, fracture content, and other rock properties.

10.0 ROCK CORE EVALUTAION PROCEDURE

A description of the rock obtained from drilling (rock core) will be documented by the AKRF Professional. Observations recorded from the rock cores are valuable in determining properties of bedrock that relate to rock slope and could be considered during foundation design. The following observations should be recorded in the Rock Core Evaluation Log:

1. Recovery
2. Rock Quality Designation (RQD)
3. Rock Type
4. Color
5. Mineralogy, Grain Size, and Texture
6. Bedding
7. Fractures
8. Size Range of Core Pieces
9. Hardness
10. Weathering
11. Additional Observations
12. Photographs

The rock core recovery of each core run is usually determined by the driller and should be recorded on the boring/rock core logs, as well as in the field book. When the recovery is not made available, it is measured as a percent of the length of the core recovered, divided by the total length of the core run. Rock cores will be placed in core boxes (provided by the driller) for logging and any subsequent review or analysis.

10.1 Rock Quality Designation (RQD)

The RQD is a modified measure of recovery, calculated in order to estimate the quality of the intact rock mass. The RQD (in percent) is obtained by dividing the sum of all the recovered pieces of core equal to or greater than 4 in. (100 mm) in length by the total length of the core run, then multiplying by 100. In effect, the RQD is a measure of the spacing of the discontinuities (bedding, fractures, faults, joints, shear zones, etc.) in the rock mass. When calculating RQD, it is important to try to distinguish between naturally occurring discontinuities and mechanical breaks which occurred during coring. Only naturally occurring discontinuities should be considered. When there is uncertainty, a break should be considered as natural so as to be conservative in the calculation of RQD. In addition, only sound bedrock is used in the calculation of RQD. Weak and/or weathered rock is not included in the calculation.

10.2 Rock Type

Geologists divide rocks into three types based on origin and then subdivide this into smaller groups on the basis of composition and texture. The three rock types are igneous, metamorphic, and sedimentary rocks. The tables listed below provide characteristics of each rock group. This will facilitate the ability to identify the particular rock.

TABLE 2 – COMMON IGNEOUS ROCKS

IGNEOUS ROCKS				
ROCK NAME	**COLOR GROUP**	**TEXTURE**	**MINERALS**	**PROPERTIES**
PEGMATITE	Light colored	Very coarse grained.	Quartz Feldspar Mica	Quartz and feldspar predominate but can contain many minerals. Feldspar is white, pink or green. Moderately difficult to drill.
GRANITE		Coarse to fine interlocking grains.	Quartz Feldspar Mica Hornblende Pyroxene	White, gray, or pink. Quartz is a major constituent. Can have a salt and pepper texture. Feldspar is white, pink, or green. Moderately difficult to drill.
SYENITE		Coarse to fine interlocking grains.	Feldspar Mica Hornblende Pyroxene	Little or no quartz. Feldspar is white or pink. Can have a salt and pepper texture. Moderately difficult to drill.
DIORITE	Dark colored	Coarse to fine interlocking grains.	Feldspar Biotite Hornblende Pyroxene	Often greenish in appearance. Often contains quartz (quartz diorite). Feldspar is white or gray. Moderately difficult to drill.
GABBRO		Coarse interlocking grains.	Feldspar Hornblende Pyroxene	No quartz. Feldspar is white or gray. Difficult to drill. The intrusive variety of basalt.
DIABASE		Medium to fine interlocking grains.	Feldspar Hornblende Pyroxene	No quartz. Commonly called traprock. Moderately difficult to drill.
BASALT		Fine interlocking grains.	Feldspar Hornblende Pyroxene	No quartz. Feldspar is white or gray. Difficult to drill. The extrusive variety of gabbro.

TABLE 3 – COMMON METAMORPHIC ROCKS

METAMORPHIC ROCKS				
ROCK NAME	**COLOR**	**STRUCTURE**	**MINERAL COMPOSITION**	**PROPERTIES**
QUARTZITE	White Gray Red	Massive	Quartz	Glassy appearance. Hard. Can scratch glass and steel. Breaks across grains (no pre-existing fracture planes). Very difficult to drill.
MARBLE	White Gray		Calcite Dolomite	Often distinctly crystalline. Can be scratched with a knife or nail. Can contain flakes of graphite. Effervesces in dilute (5%) hydrochloric acid. Drills easily.
SERPENTINITE	Yellowish Green		Serpentine	Soft. Can be easily scratched with a knife or nail. Often fractured. Drills easily. Potential to contain asbestos fibers.
GNEISS	Gray Green Pink	Banded	Quartz Feldspar Mica	Banded appearance due to alignment of elongate and platy minerals. Usually moderately difficult to drill.
SCHIST	Green Gray Brown	Foliated (coarse-grained)	Mica Quartz Feldspar	Foliation due to alignment of platy minerals. Contains a lot of mica. Drills easily.
SLATE/ PHYLLITE	Gray Red Green Purple	Foliated (fine-grained)	Mica Quartz Feldspar	Foliation due to alignment of platy minerals. Can be distinguished from shale by its usually shiny surface. Moderately easy to drill.

TABLE 4 – COMMON SEDIMENTARY ROCKS

ROCKS						
ROCK SEDIMENTARY NAME	**STRUCTURE**	**COLOR**	**PARTICLE SHAPE AND SIZE**	**PREDOMINANT MINERAL COMPOSITION**	**CEMENT/ MATRIX**	**PROPERTIES**
CONGLOMERATE	Massive or layered	Red Gray Brown	Very coarse to fine grains.	Rock fragments.	Iron Calcite Silica Clay	Major portion composed of pebbles up to or more than an inch in diameter. Moderate to difficult to drill (depending on type of fragments & matrix).
SANDSTONE		Red Gray Brown	Medium to fine grains.	Rock fragments. Quartz Feldspar	Iron Calcite Silica Clay	Moderate to difficult to drill (depending on type of fragments & matrix).
LIMESTONE		Light Gray to Black	Angular to rounded grains.	Calcite	Calcite Silica Clay	Often dense. Effervesces freely in dilute (5%) hydrochloric acid. Often fossiliferous. May contain veins of calcite. Can be scratched with a knife or nail. Easy to drill. May contain chert (microcrystalline quartz) which is very difficult to drill. May contain Dolomite.
DOLOSTONE		White to Dark Gray	Angular to rounded grains.	Dolomite	Calcite Silica Clay	Similar to limestone but effervesces feebly in dilute (5%) hydrochloric acid. Can be scratched with a knife or nail. Drills easily. May contain chert, which is very difficult to drill. May contain Calcite.
SILTSTONE MUDSTONE SHALE CLAYSTONE	Laminated	Red Black Gray Green Purple	Fine to very fine particles.	Clay Quartz Feldspar	Clay Calcite Silica	Generally dull in appearance. Can be confused with fine-grained limestone but will not effervesce (when pure) in hydrochloric acid. May contain pyrite (fool's gold) crystals. May contain calcite and/or quartz veins. Can be scratched with a knife or nail. Drills easily. The different names (siltstone to claystone) are based on diminishing grain size.

10.3 Color

Record the color of the recovered rock, which is determined by comparing the core pieces with color chips in the Geological Society of America (GSA) Rock Color Chart. Variations in color, if considered important, are also noted on the field log.

10.4 Mineralogy, Grain Size, and Texture

Record a description of the major minerals composing the rock. If possible, the size of the individual grains/crystals and the texture of the rock (very fine to very coarse) should be noted. General descriptions of mineralogy, grain size, and texture for the various rock types should be included (as shown in Rock Type Tables 2-4, in Section 10.2 of this SOP).

10.5 Bedding

The following table lists the categories of bedding used in describing sedimentary rock:

TABLE 5 – SEDIMENTARY ROCK BEDDING

BEDDING	DESCRIPTION
Very Thick-Bedded	Greater than 4 ft. (> 1.2 m)
Thick-Bedded	1 ft. to 4 ft. (0.3 m to 1.2 m)
Medium-Bedded	4 in. to 12 in. (100 mm to 300 mm)
Thin-Bedded	1.2 in. to 4 in. (30 mm to 100 mm)
Very Thin-Bedded	0.5 in. to 1.2 in. (13 mm to 30 mm)
Thickly Laminated	0.1 in. to 0.5 in. (3 mm to 13 mm)
Thinly Laminated	Less than 0.1 in. (< 3 mm)
None	

For igneous and metamorphic rocks, record any observable planar features (foliation, banding, etc.) using the same thickness designations as sedimentary bedding.

Fractures

Recording the spacing, orientation, filling, and degree of healing of the fractures can be important in determining the properties of the rock mass for future foundation design, as well as the potential for water bearing fracture and contaminant migration. The following tables list the fracture density (FD) and fracture healing (FH) categories:

TABLE 6 – FRACTURE DENSITY

DEGREE OF FRACTURING	DESCRIPTION
Unfractured	No observed fractures.
Very slightly fractured	Core recovered in lengths greater than 3 ft. (1 m).
Slightly to very slightly fractured	Core recovered in lengths from 1 to 3 ft. (0.3 to 1 m).
Slightly fractured	Core recovered mostly in lengths from 1 to 3 ft. (0.3 to 1 m) with few scattered lengths less than 1 ft. (0.3 m) or greater than 3 ft. (1 m).
Moderately to slightly fractured	Core recovered mostly in lengths averaging 1 ft. (0.3 m).
Moderately fractured	Core recovered mostly in lengths from 0.33 to 1 ft. (0.1 to 0.3 m) with most lengths about 0.67 ft. (0.2 m).
Intensely to moderately fractured	Core recovered mostly in lengths of 0.33 to 0.67 ft. (0.1 to 0.2 m) with most lengths about 0.5 ft. (0.15 m).
Intensely fractured	Core recovered mostly in lengths from 0.1 to 0.33 ft. (0.03 to 0.1 m) with most lengths less than 0.33 ft. (0.1 m) and with fragmented intervals.
Very intensely to intensely fractured	Core recovered as short core lengths averaging less than 0.1 ft. (0.03 m).
Very intensely fractured	Core recovered mostly as chips and fragments with a few scattered short core lengths.

TABLE 7 – FRACTURE HEALING

DEGREE OF HEALING	DESCRIPTION
Totally Healed	Fracture is completely healed or re-cemented to a degree at least as hard as surrounding rock.
Moderately Healed	Greater than 50% of fracture material, fracture surfaces, or filling is healed or re-cemented and/or the strength of the healing agent is less hard than surrounding rock.
Partly Healed	Less than 50% fracture material, filling, or fracture surface is healed or re-cemented.
Not Healed	Fracture surface(s), fracture zone, or filling is not healed or re-cemented.

Size Range of Core Pieces

Record the range of sizes found in the pieces of core recovered in the run. The size may range from fragments too small to measure up to a single piece the entire length of the run. Note the locations of significant fragmented zones.

Hardness

The following table lists the rock hardness categories:

TABLE 8 – ROCK HARDNESS

DESCRIPTION	LONG DESCRIPTION
Very soft rock	Can be scratched with fingernail. Slight indentation produced by light blow of point of geologic pick. Requires power tools for excavation.
Soft rock	Hand-held specimen crumbles under firm blows with point of geologic pick.
Moderately soft rock	Shallow indentations (0.04 to 0.12 in. [1 to 3 mm]) can be made by firm blows with point of geologic pick. Can be peeled with pocket knife with difficulty.
Moderately hard rock	Can't be peeled or scraped with knife. Can be distinctly scratched with a steel nail.
Hard rock	Intact hand-held specimen requires more than one hammer blow to break it. Can be faintly scratched by steel nail.
Very hard rock	Cannot be scratched with a steel nail. Intact specimen breaks only by repeated, heavy blows with geologic hammer.
Extremely hard rock	Intact specimen can only be chipped, not broken, by repeated, heavy blows of a geologic hammer.

Weathering

The following table lists weathering categories:

TABLE 9 – WEATHERING CATEGORIES

DEGREE OF WEATHERING	DETAILED DESCRIPTION
Residual soil	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.
Completely weathered	Minerals decomposed to soil but fabric and structure preserved (saprolite). Specimens easily crumbled or penetrated.
Highly weathered	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Moderately weathered	Discoloration throughout. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped with knife. Texture observed.
Slightly weathered	Slight discoloration inwards from open fractures.
Fresh	No visible sign of decomposition or discoloration. Rings under hammer impact.

11.0 BEDROCK WELL INSTALLATION PROCEDURES

Since an open borehole well is mainly used for potable water supply, is subject to cave-in, and is not advised at contaminated sites, this Section includes only procedures for installing a screened and cased sand-packed well into the bedrock borehole using either the single or double cased drilling methods. In some very sensitive investigations that cross multiple geologic units (or aquifers), triple cased wells may need to be considered. These procedures are as follows:

1. Before the well screen and casings are installed, at least 6 inches of morie sand pack material should be placed at the bottom of the borehole to serve as a firm footing.
2. The well casings should be secured to the well screen by flush-jointed threads, placed into the borehole, and plumbed.
3. After the string of well screen and casing is plumbed, the sand filter pack material should be placed around the well screen to the designated depth. The filter pack sand in open boreholes should be installed by tremie methods, using water to wash the sand through the pipe to the point of placement. While it is a common practice to omit the filter pack around the well screen in some open rock borehole installations, it is not advisable. However, without the filter pack to protect the screened interval, sediment particles from the well installation and/or from the monitoring zone could clog the well screen and/or fill the screened portion of the well, rendering it inoperable. Also, the filter pack serves as a barrier between the bentonite seal and the screened interval.
4. After the filter pack has been installed, the bentonite pellet seal (if used) should be placed directly on top of the filter pack to an unhydrated thickness of two feet. When installing the seal for use with neat cement grouts, the bentonite pellet seal should be allowed to hydrate for a minimum of eight hours or the manufacturer’s recommended hydration time, whichever is longer.
5. The open borehole should be grout sealed from the top of the bentonite to the ground surface, and finished with a locking steel stick up or flush manhole with a concrete collar.
6. After the wells have been installed, the outer protective casing should be painted a highly visible color.
7. The wells should be permanently marked with the well number on the cover and/or in an appropriate place that will not be easily damaged, vandalized, or covered up.
8. Non-dedicated equipment should be decontaminated between borings in accordance with SOP #H-SI-12.

12.0 WELL DEVELOPMENT PROCEDURES

A newly completed monitoring well should not be developed for at least 24 hours after the surface pad and outer protective casing are installed. This will allow sufficient time for the well materials to cure. The main purpose of developing wells is to remove the residual materials from installation, and to try to re-establish the natural hydraulic flow conditions of the formations which may have been disturbed by well construction (refer to SOP #H-SI-07 for well development procedures).

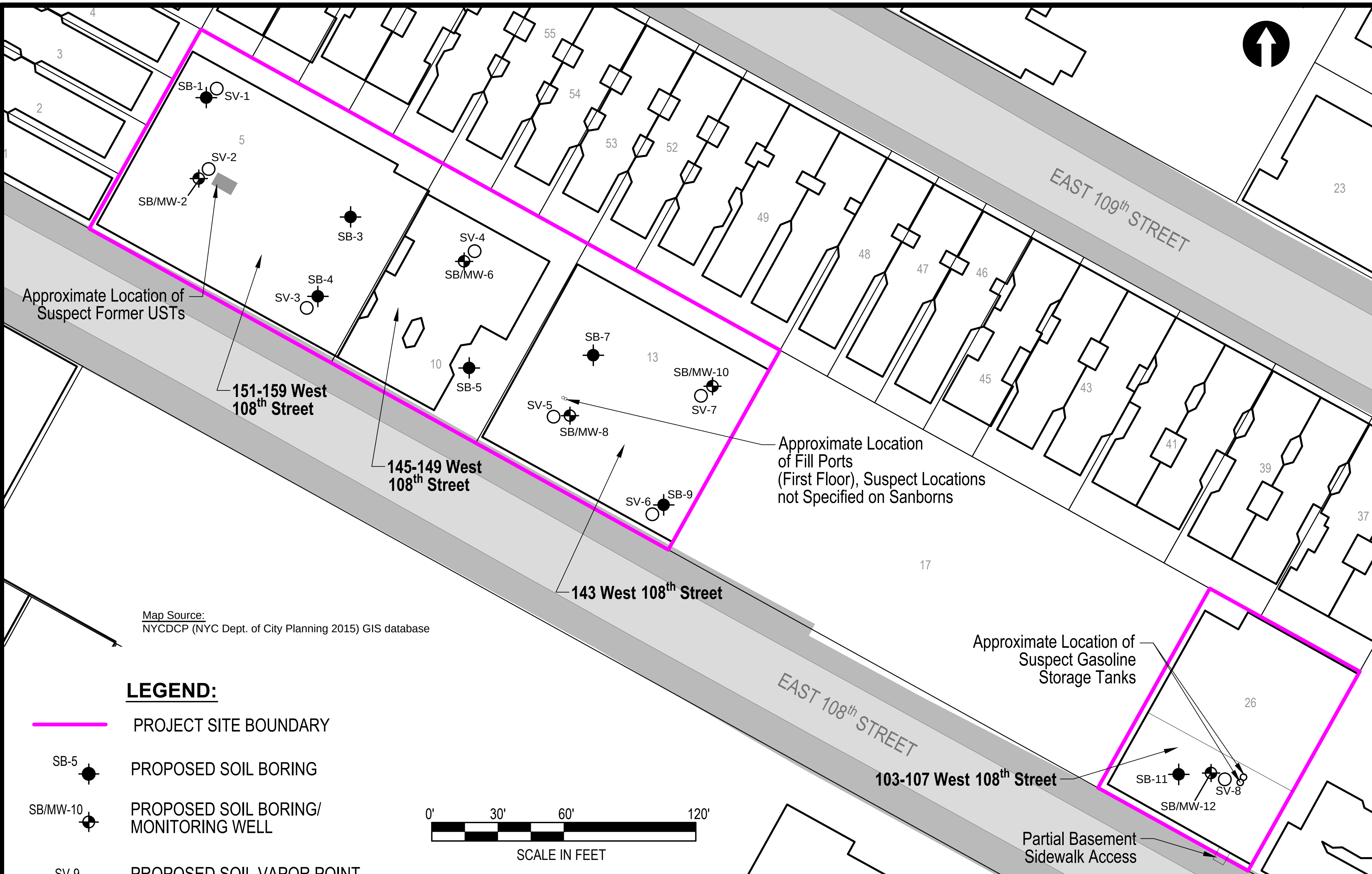
13.0 INVESTIGATION DERIVED WASTE (IDW)

IDW must be handled in a particular manner to protect human health and the environment, and to be compliant with applicable rules and regulations. Contaminated soil and groundwater should be containerized in Department of Transportation (DOT)-approved 55-gallon drums and labeled accordingly (pending sampling results). Grossly contaminated personal protective equipment (PPE) should also be containerized in 55-gallon drums. When handling IDW, AKRF employees should follow any protocols set forth in SOP #H-SI-13, Investigation Derived Waste.

14.0 REFERENCES

1. U.S. Environmental Protection Agency – Science and Ecosystem Support Division – Design and Installation of Monitoring Wells – February 2008.
2. USEPA – Monitoring Well Installation SOP#2048 – March 1996.
3. New York State Department of Transportation – Geotechnical Engineering Manual 23 – August 2015.
4. American Society for Testing materials (ASTM) – D6032 - Standard Test method for Determining Rock Quality Designation (RQD) of Rock Core
5. ASTM-D2113-14 – Standard Practice for Rock Core Drilling and Sampling of Rock for Site Exploration

ATTACHMENT A:
EXAMPLE FIGURE



103-107 and 143-159 West 108th Street

New York, New York

PROJECT SITE DETAIL AND PROPOSED SAMPLING LOCATIONS

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

DATE 3/1/2016
PROJECT No. 22304
SCALE as shown
FIGURE 2

ATTACHMENT B:
EXAMPLE & BEDROCK WELL INSTALLATION LOG TEMPLATE

SINGLE CASED BEDROCK WELL INSTALLATION LOG	Site Name Site Address **AKRF Project Number:** XXXXX	**Groundwater Monitoring Well ID:** **Sheet 1 of 2**	**BRW-#**

AKRF 440 Park Avenue South, 7th Floor New York, NY 10016						
	Drilling Method:		**Drilling**			
	Sampling Method:		**Start Time:**		**Finish Time:**	
	Driller:					
	Weather:	XX °F, XX (conditions)	**Date:**		**Surface Condition:**	
	Logged by:	Initial. Last Name, AKRF				

Depth (feet)	Well Construction	Construction Description
1		**Flush-mounted well cover, locking j-plug, and concrete seal: grade to 1' below grade.**
2		**Non-shrinking cement grout: X' to X' below grade.**
3		**Bentonite Seal: X' to X' below grade.** **2" diameter PVC well casing: X' to X' below grade.**
4		**2" diameter PVC well screen: X' to X' below grade.** **Sand pack filter: X' to X' below grade**
5		
6		
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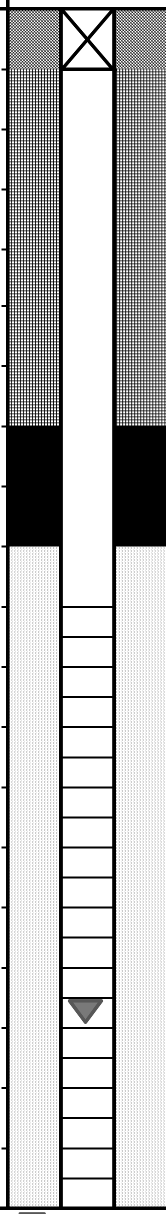


Notes: ▼ **Groundwater Depth Indicator**
Groundwater measured at XX **feet below grade in** [GW Monitoring Well ID #] **on** [Mon
Top of bedrock measured at XX **feet below grade.**
Top of competent bedrock measured at XX **feet below grade.**
Groundwater monitoring well installed to X **feet below grade.**

PID = photoionization detector NAPL = non-aqueous phase liquid ppm = parts per million ND = not detected

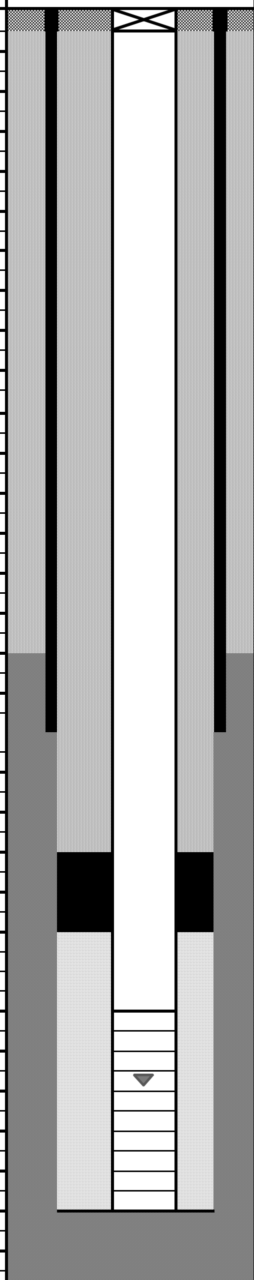
Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were

SINGLE CASED BEDROCK WELL INSTALLATION LOG	3200 Jerome Avenue AKRF Project Number : 11455	Groundwater Monitoring Well ID:	MW-3E-D
		Sheet 1 of 1	

AKRF
440 Park Avenue South, 7th Floor
New York, NY 10016

Drilling Method:	Sonic Rig/Air	Drilling	
Sampling Method:	Plastic Liners/Air Tools	Start	Finish
Driller :	ADT Drilling, Inc.	Time: 0915	Time: 1135
Weather:	45 °F, Overcast, Light Rain	Date: 12/3/12	Date: 12/7/12
Logged by:	D. Kapson, AKRF		

Well Construction



Depth (feet)	Construction Description
0	Flush-mounted well cover, locking j-plug, cap and concrete seal 0 to 0.5' below grade.
1	
2	Non-shrinking Cement Grout from 0.5' to 18' to set outer steel casing 2 feet into competent rock
3	
4	2" diamater PVC well riser (inside of steel casing) from 0 to 25'
5	
6	Grout from 0.5' to 21' to Set PVC Well Riser
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	Top of competent rock encountered at 16' below grade.
17	
18	
19	
20	
21	
22	Bentonite Seal from 21' to 23'
23	
24	Sand pack filter 23' to 30' below grade.
25	
26	002-Slot 2" PVC well screen 25' to 30' below grade
27	
28	
29	
30	30' Below Sidewalk Grade - Bottom of Well
31	
32	

Notes: ▼ Groundwater Depth Indicator
Groundwater measured at 27.22 feet below grade in MW-3E-D on 12-7-12.
Top of competent bedrock measured at 16 feet below grade.

Groundwater monitoring well installed to 30 feet below grade; screened 25 to 30 feet below grade.

PID = photoionization detector NAPL = non-aqueous phase liquid ppm = parts per million ND = not detected

Soil classifications and descriptions presented are based on the Modified Burmister Classification System. Descriptions were developed for environmental purposes only.

ATTACHMENT C:
EXAMPLE & ROCK CORE EVALUATION LOG TEMPLATE

ROCK CORE EVALUATION LOG

Project: ____

Boring ID: ________________

Surface Elevation: ___________________________________

Depth Drilled: From ______________ to ______________

Number of Runs: ___________________________________

Core Size:
____

Date Evaluated ____

Evaluator (s) ____

Top of Rock________________(Depth) _____________ (Elevation)

Top of Sound Rock ______________ (Depth)_____________ (Elevation)

Comments:

RUN # ___ Run Length __________________________ Depth Range:From ____ to ____

RQD __________ (as measured) ________ % Photo(s) ______________

Rock Type ____

Color ____

Mineralogy, Grain Size, & Texture_______________________________

Bedding ____

Fractures ____

Size Range of Pieces ____

Hardness ____

Weathering ____

Additional Comments:

RUN # ___ Run Length_________________________Depth Range:From ____ to ____

RQD __________ (as measured)_________ % Photo(s) ______________

Rock Type____

Color ____

Mineralogy, Grain Size, & Texture __________________________________

Bedding____

Fractures ____

Size Range of Pieces____

Hardness ____

Weathering ____

Additional Comments

RUN # ___ Run Length_________________________Depth Range:From ____ to ____

RQD __________ (as measured)_________ % Photo(s) ______________

Rock Type____

Color ____

Mineralogy, Grain Size, & Texture __________________________________

Bedding____

Fractures ____

Size Range of Pieces____

Hardness ____

Weathering ____

Additional Comments:

AKRF, Inc.

ROCK CORE EVALUATION LOG

Project: Riverdale Country School- Natatorium Building__

Boring ID: _____B-4_________

Surface Elevation: 156.5 feet above mean sea level (amsl) ___

Depth Drilled: From ______4.5________ to 9.5 ft. below ground surface (fbgs)

Number of Runs: 2 (C1, C2) ____________________________

Core Size: C1 = 5’; C2 = 5’ ___________________________

Date Evaluated: 08/20/2014 _________________________________

Evaluator (s): J. Holmberg __________________________________

Top of Rock: 4.5 fbgs (Depth) _152 feet (Elevation)

Top of Sound Rock 4.5 fbgs (Depth) _ 152 feet (Elevation)

Comments:

RUN # _C1__ Run Length = 5’ ______________________ Depth Range: From __4.5’__ to __9.5’__

RQD __________ 55/60”(as measured) = 92% Photo(s)- Attached.___________

Rock Type: Gneiss Bedrock_____________________________________

Color: Grey ____

Mineralogy, Grain Size, & Texture: Quartz and feldspar ______________

Bedding: N/A____

Fractures: Moderately Fractured; Closely Jointed ____________________

Size Range of Pieces: 3” to 28” __________________________________

Hardness: Medium/Moderately Hard ____________________________

Weathering: Slightly Weathered _________________________________

Additional Comments: Mechanical breaks and joint fractures observed at 45°

RUN # _C2_ Run Length = 5’ Depth Range: From 9.5’__ to __14.5’______

RQD: 36/60”(as measured) =60% _______ Photo(s)- Attached__________

Rock Type: Gneiss Bedrock ______________________________________

Color: Grey ____

Mineralogy, Grain Size, & Texture: Quartz and feldspar _______________

Bedding: N/A ____

Fractures: Moderately Fractured; Closely Jointed _____________________

Size Range of Pieces: 3” to 11”____________________________________

Hardness: Medium/Moderately Hard _____________________________

Weathering: Slightly Weathered __________________________________

Additional Comments: Several mechanical breaks at top and bottom of core and two joint fractures observed at 30° and 45°, respectively near the midpoint of C2

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

MONITORING WELL DEVELOPMENT

SOP#: H-SI-07

March 2018

Prepared By:

Name: Patrick Diggins Signature: Date: 3-1-18

Prepared By:

Name: Bryan Zieroff Signature: Date: 3-1-18

Approved By:

Name: Michelle Lapin Signature: Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals in procedures for the development of permanent groundwater monitoring wells installed in either overburden or bedrock. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

The purpose of monitoring well development is to ensure removal of fine grained sediments (aka "fines") from inside the permanent well, and from the sand pack around the well. Removing fines reduces the turbidity of the water and will maximize the groundwater flow potential from the formation into the well while also allowing the sand pack to properly filter groundwater, thereby ensuring that representative groundwater samples are collected. AKRF well development methods include the modified surge technique and the bailer technique. The former is preferred. This SOP will describe both methods.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during monitoring well development, as appropriate:

SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-06	Groundwater Monitoring Well Installation – Bedrock
SOP #H-SI-08	Standard Groundwater Sampling
SOP #H-SI-09	Low-Flow Groundwater Sampling
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste
SOP #H-FW-01	Documentation

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional utilizing this SOP:

- OSHA Level D PPE
- Nitrile Gloves
- Oil/Water Level Indicator & Decontamination Supplies
- Photoionization Detector (PID) & Calibration Kit
- Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- Permanent Marker and Field Book
- Water quality meter
- Five-gallon plastic bucket
- 55-gallon, closed-top, plastic or stainless steel drum

- Drum Labels
- For a 2-inch well, a submersible groundwater pump (whale or monsoon pump) and associated equipment
- For a 1-inch well, a peristaltic pump and associated equipment
- Surge block (if available)
- Other:____________________________

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-specific HASP
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Monitoring Well Locations (See Attachment A for a Figure Example)
- Soil Boring/Monitoring Well Logs from previous investigations at the site, if any
- Monitoring Well Installation Log completed for the well to be developed (See SOP #H-SI-05 or #H-SI-06)
- AKRF Monitoring Well Development Logs (see Attachment B for the Monitoring Well Development Log Template and a completed example), to be completed during implementation of this SOP
- Related SOPs Listed in Section 3.0

6.0 SITE PREPARATION

1. Coordinate site access, and a secure on-site location to store the 55-gallon drum(s) of water/fines produced during well development.
2. Obtain information on each well to be developed (i.e., drilling method, well diameter, well depth, screened interval, anticipated contaminants, etc.).
3. Obtain an oil-water interface probe, PID, disposable bailers (of appropriate diameter for your wells), materials for decontamination, and water quality instrumentation capable of measuring, at a minimum: pH, specific conductivity, temperature, turbidity, dissolved oxygen (DO), and salinity.
4. Obtain the well development equipment and containers for temporary storage of water produced during well development (e.g. the surge block, groundwater pump, buckets or drums, etc.).

Note: the United States Environmental Protection Agency (USEPA) guidance recommends the use of a surge block for well development. Depending on the objectives and budget of the project, use of a surge block may be appropriate; discuss with the Project Manager prior to mobilization to confirm specific protocols.

7.0 MONITORING WELL DEVELOPMENT – SURGE METHOD

Well development should take place at least 24 hours after installation of the permanent monitoring well; USEPA recommends 48 hours. Confirm the required wait time with the Project Manager.

1. Assemble necessary equipment on a plastic sheet surrounding the well.
2. Record pertinent information in the site or personal field notebook and/or on the monitoring well development log (personnel, time, location ID, etc.).
3. Open the monitoring well and take a PID reading at the top of the casing and in the breathing zone.

4. Measure the depth to water and the total depth of the well. Calculate the water column volume as:

$$\textbf{Water column volume (in gallons)} = \pi r^2 h\ (cf)$$

where: π = pi (3.14)
r = radius of monitoring well in feet
h = height of the water column in feet (determined by subtracting the depth to water from the total depth of the well, as measured from the same reference point)
cf = conversion factor (7.48 gal/ft^3)

5. If the oil-water interface probe detects light non-aqueous phase liquid (LNAPL) in the well, it should be developed using the bailer method described below.
6. Insert the surge block into the well, and allow it to sink to the bottom. Surge the screened zone in 3 foot intervals by lifting the block.
7. Remove the block, insert the groundwater pump, and pump out groundwater. The type of pump used will depend on the type and size of the well. For 1-inch wells, a peristaltic pump or bladder pump will be required. For a 2-inch well (or larger) a submersible (Monsoon-type) pump or an inertial (Waterra-type) pump is appropriate. Record the initial water quality parameters (pH, specific conductivity, temperature, turbidity, DO, and salinity) in the field notebook and/or development log. Note any colors or odors.
8. If a surge block is not available, start by inserting the groundwater pump. Then turn on the pump and "surge" by raising and lowering the pump across the screen interval.
9. Continue to develop the well by surging and pumping. Measure the water quality parameters every five minutes. Development should continue until the water quality parameters stabilize (within 10%) for three successive readings, and the water has a turbidity of less than 50 nephelometric turbidity units (NTUs) for three successive readings. Depending on project objectives and site specific geology, achievement of 50 NTUs may not be possible. The well developer should confer with the Project Manager to establish when development is complete.
10. All water produced by development of contaminated or suspected contaminated wells must be containerized in 55-gallon drums. Each container must be clearly labeled with the location ID, date collected, and property owner. Proper waste handling is described in the Investigation Derive Waste SOP (#H-SI-13).
11. Once water quality parameters have stabilized, note the final water quality parameters in the field notebook or on the development log. Also record the time of well development and the volume removed.

8.0 MONITORING WELL DEVELOPMENT – BAILER METHOD

The timing of well development (at least 24 or 48 hours after installation) should be as described in Section 7.0.

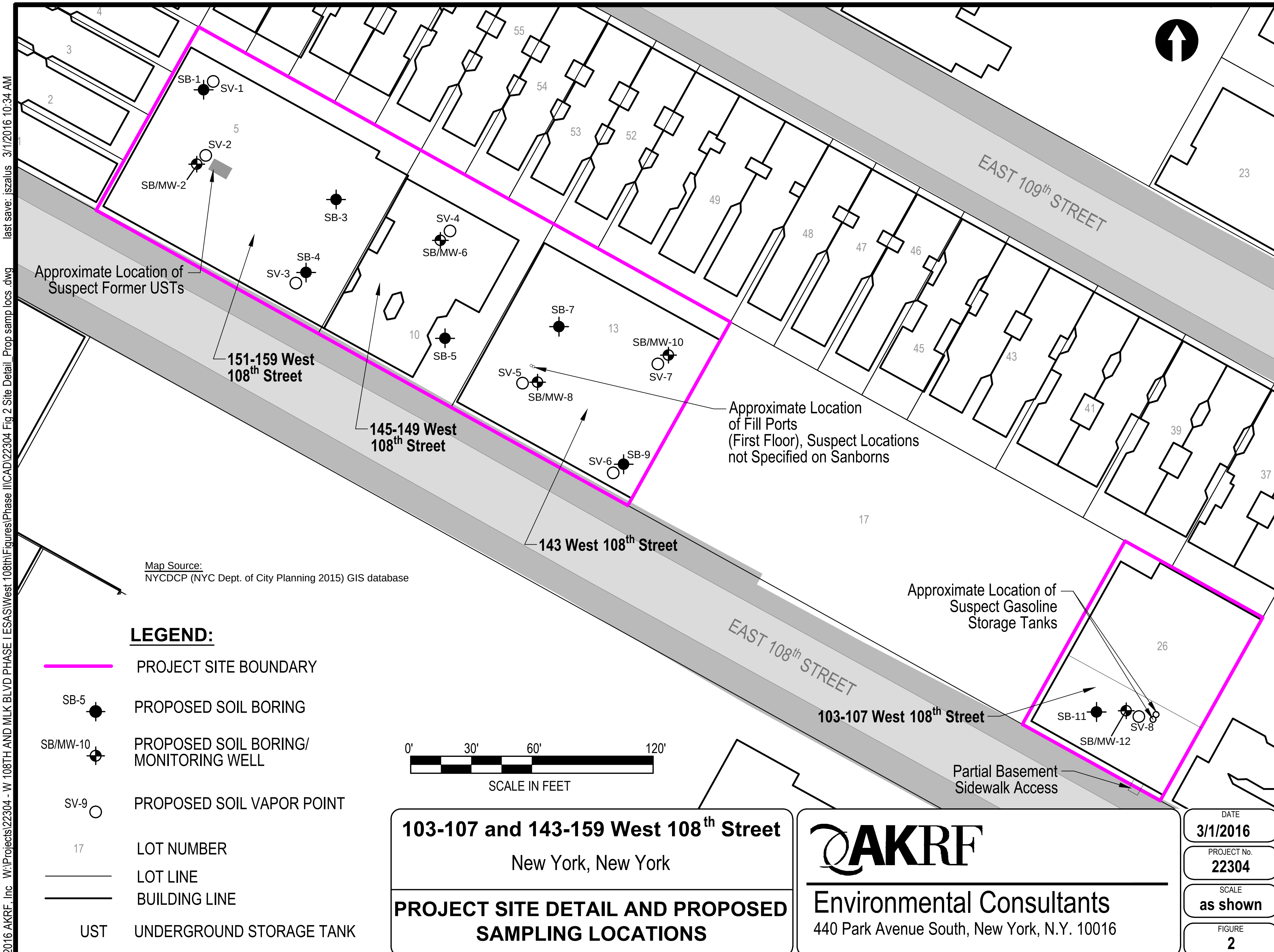
1. Assemble necessary equipment on a plastic sheet surrounding the well.
2. Record pertinent information in the site or personal field notebook and/or on the monitoring well development log (personnel, time, location ID, etc.).
3. Open monitoring well and take a PID reading at the top of the casing and in the breathing zone.

4. Measure depth to water and the total depth of the monitoring well. Calculate the water column volume of the well using the equation in Section 7.0.
5. If LNAPL is detected, drop the bailer to the groundwater interface and retract. Measure the thickness of the LNAPL in the bailer and record the measurement in your log.
6. Begin by surging the well as described in Section 7.0.
7. After surging, complete groundwater and sediment removal by dropping the disposable polyethylene bailer to the bottom of the well, retrieving the contents, and pouring it into a five-gallon bucket. Allow the bailer to contact the bottom of the well multiple times to allow for sediment to pass through the check valve system at the bottom of the bailer.
8. Use the water quality meter to determine the initial parameters. Record the water quality parameters in the field notebook or monitoring well development log. Note any colors or odors.
9. If a surge block is not available, complete the surge by raising and lowering the bailer across the screen interval inside the well.
10. Development should continue until three well volumes have been removed and the water appears clear in the bailer.
11. Record water quality parameters after each well volume, and at the end of development. Also record the time of well development completion and the total volume removed.
12. Non-dedicated equipment should be decontaminated between borings in accordance with SOP #H-SI-12.
13. All water produced by development of contaminated or suspected contaminated wells must be containerized in 55-gallon drums. Each container must be clearly labeled with the location ID, date collected, and property owner. Proper waste handling is described in the Investigation Derive Waste SOP (#H-SI-13).

9.0 REFERENCES

Standard Operating Procedure for Monitoring Well Development, United States Environmental Protection Agency, SOP Number 2044, Revision Date October 23, 2001.

ATTACHMENT A:
EXAMPLE FIGURE



103-107 and 143-159 West 108th Street

New York, New York

PROJECT SITE DETAIL AND PROPOSED SAMPLING LOCATIONS

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

DATE 3/1/2016

PROJECT No. 22304

SCALE as shown

FIGURE 2

ATTACHMENT B:
EXAMPLE & MONITORING WELL DEVELOPMENT LOG TEMPLATE

AKRF

Well Development Log

Job No:	**Client:**	**Well No:**
Project Location:	**Sampled By:**	
Date:	**Time:**	

Total Depth:	**ft.**	**Well Diameter:**	**in.**	**Well Volume (V) = Br 2 h (cf)**
Depth to Water:	**ft.**	**Well Volume*:**	**gal.**	B = pi (approx. 3.14) r = monitoring well radius in ft. h = height of the water column in ft. cf = conversion factor = 7.48 gal/ft^3
Water Column (WC):	**ft.**			

Time	**Pump Rate**	**Turbidity** (NTU)	**Temperature** (^oC)	**Conductivity** (mS/cm)	**DO** (mg/L)	**pH**	**ORP** (mV)	**Comments** (note color or odors)

Total Volume Purged:

For Surge Method:Purge until water quality parameters are stabile (within 10%) for three successive readings, and turbidity is less than 50 NTU for three successive readings. For Bailer Method: Purge a minimum of three well volumes and water appears clear in the bailer.

Groundwater Monitoring Well Development Log

AKRF Project No:	12184	**Installed By:**	Aarco Environmental Services
Project Location:	275 Chestnut Street, Brooklyn, New York	**Developed By:**	Aarco Environmental Services and AKRF
Client:	Atlantic Chestnut Affordable Housing LLC	**Logged By:**	E. Matamoros, AKRF
Date:	12/1/2017	**Weather:**	37 °F, Sunny

Development Setup

Start Time:	8:25	**Stop Time:**	11:35
Headspace PID:	0.8 parts per million (ppm)	**Well Diameter:**	2 inches
Total Depth:	80.92 feet below top of casing	**1 Well Volume*:**	7.95 gallons
Depth to Water:	32.15 feet below top of casing	**Volume Purged:**	26 gallons
Water Column:	48.77 feet below top of casing	**Pump Type:**	Waterra Hydrolift

Groundwater Monitoring Well Information

Groundwater Monitoring Well ID:	L3-SRI-MW-10S	**Groundwater Monitoring Well Installation Date:**	11/15/2017

Groundwater Monitoring Well Development Parameters

Time	Pump Rate (mL/min)	Temperature (°C)	pH	ORP (mV)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
8:25	600	12.16	6.38	53	0.587	>1000	3.76
8:30	600	12.17	6.64	76	0.571	>1000	3.23
8:35	600	12.33	6.37	67	0.572	846	2.10
8:40	600	13.8	6.20	61	0.561	622	2.08
8:45	600	13.51	6.23	68	0.558	530	2.01
8:50	600	13.86	6.16	59	0.554	397	2.09
8:55	600	13.93	6.08	43	0.553	270	2.17
9:00	600	12.08	6.43	69	0.548	202	0.37
9:05	600	12.96	6.31	65	0.552	189	0.21
9:10	600	13.54	6.24	62	0.554	172	0.00
9:15	600	13.06	6.46	79	0.531	157	0.00
9:20	600	12.98	6.52	87	0.506	148	0.00
9:25	600	12.76	6.17	71	0.558	138	0.00
9:30	600	13.93	6.15	73	0.549	124	0.00
9:35	600	14.13	6.07	74	0.546	98	0.00
9:40	600	14.07	6.08	87	0.547	97.6	0.00
9:45	600	13.82	6.12	73	0.547	92.8	0.00
9:50	600	14.49	5.97	72	0.547	88.6	0.00
9:55	600	14.38	6.02	64	0.548	87.8	0.00
10:00	600	13.73	6.06	46	0.556	76.9	0.00
10:05	600	12.31	6.40	54	0.554	67.4	0.00
10:10	600	12.49	6.30	62	0.551	61.7	0.00
10:15	600	12.41	6.16	82	0.557	58.3	0.00
10:20	600	12.27	6.08	84	0.568	49.9	0.00
10:25	600	13.87	6.06	71	0.547	54	0.00
10:30	600	13.62	6.29	55	0.546	49.8	0.00
10:35	600	13.43	6.15	24	0.55	56.9	0.00
10:40	600	13.3	6.09	7	0.558	64	0.00
10:45	600	13.15	6.09	15	0.56	68.6	0.00
10:50	600	13.07	6.08	13	0.561	63.1	0.00
10:55	600	13.02	6.07	21	0.562	65.2	0.00
11:00	600	13.46	6.13	53	0.553	56.8	0.00
11:05	600	13.49	6.11	49	0.553	57.3	0.00
11:10	600	13.76	6.01	61	0.55	62.1	0.00
11:15	600	14.362	6.30	31	0.546	65	0.00
11:20	600	13.87	5.85	98	0.526	59.9	0.00
11:25	600	14.34	6.06	49	0.539	48.1	0.00
11:30	600	14.49	6.07	69	0.539	33.7	0.00
11:35	600	14.5	6.06	67	0.54	30.7	0.00

Notes:	PID = Photoionization Detector	ND = Not Detected	WC = Water Column	ORP = Oxidation Reduction Potential
Volume Calculations:	*= 0.041 x WC for 1" wells	*= 0.163 x WC for 2" wells	*= 0.653 x WC for 4" wells	*= 1.469 x WC for 6" wells
Comments:	None			

Record readings in 5-minute intervals. Purge until turbidity is less than 50 NTU for three successive readings or until water quality indicators are within 10% for three successive readings. Purge a minimum of three well volumes.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

STANDARD GROUNDWATER SAMPLING

SOP#: H-SI-08

March 2018

Prepared By:

Name: Steve Grens Signature: ____________ Date: 3-1-18

Prepared By:

Name: Deborah Shapiro Signature: D. Shapiro Date: 3-1-18

Approved By:

Name: Marc Godick Signature: ____________ Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: ____________ Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to perform groundwater sampling using traditional purging, i.e., not "low-flow" sampling. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

These groundwater sampling procedures are to be used on sites that do not require low-flow groundwater sampling techniques (refer to SOP #H-SI-09, Low-Flow Groundwater Sampling, for more information about low-flow sampling). These sites typically include Phase II Subsurface Investigations where temporary 1-inch and/or 2-inch monitoring wells are installed, or where groundwater samples are collected directly from direct push probe sampling rods using a Geoprobe unit.

All activities will be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be utilized or cross-referenced during standard groundwater sampling, as appropriate:

SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-06	Groundwater Monitoring Well Installation – Bedrock
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-09	Low-Flow Groundwater Sampling
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- Field Vehicle
- OSHA Level D PPE (e.g., Nitrile Gloves, Safety Glasses, Splash Guard, and Coveralls)
- Photoionization Detector (PID) & Calibration Kit
- Oil/Water Interface Probe
- Keys to Wells
- Turbidity Meter (Myron Ultrameter II)
- Groundwater Pump (e.g., Submersible, Check-Valve, Peristaltic Pump)
- Dedicated Sample Tubing
- Dedicated Bailers (PVC)
- 12 Volt Marine Battery and Charger
- Bailer Twine

- Tool Kit (Ratchet Set, Hammer, Flat Head Screw Driver)
- 5-Gallon Bucket(s) and Lids for Purge Water
- 55-Gallon DOT-Approved Drum(s)
- Drum Labels
- Decontamination Supplies
- First Aid Kit with General Supplies
- Laboratory Supplied Sampling Jars
- Cooler(s) and Ice for Sample Shipment
- Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- Permanent Marker
- Field Book
- Trash Bags
- Measuring wheel/tape (to locate wells)
- Plastic sheeting

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional using this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Proposal and/or Work Plan
- A Site-specific Quality Assurance Project Plan (QAPP), if applicable
- Chain of Custody (COC) (See Attachment A for an example COC)
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Monitoring Well Locations (See Attachment B for a Figure Example)
- Previously Completed Monitoring Well Installation Logs (If Available)
- AKRF Well Sampling Log (see Attachment C for the Well Sampling Log Sheet Template and a completed example), to be completed during implementation of this SOP
- Related SOPs Listed in Section 3.0

6.0 STANDARD GROUNDWATER SAMPLING PROCEDURES

Permanent monitoring wells must be developed at least one week prior to sampling (see SOP #H-SI-07, Monitoring Well Development) unless the AKRF Project Manager directs otherwise. Sampling will be conducted according to the following procedures:

- Don safety equipment, as required by the HASP.
- Locate the well using the scaled Figure/Maps/Drawings (see Attachment B for an example of a Figure showing groundwater monitoring well locations). Use a measuring wheel or tape if necessary.
- Record site and monitoring well location on the groundwater sampling log (see Attachment C for an example of a well sampling log).
- Prepare the sampling area by placing plastic sheeting over the well. Cut a small hole in the sheeting to provide access to the well.
- Remove any cover and locking cap and measure the vapor concentrations in the well with a PID immediately after opening.

- Measure the total well depth and depth to water from the mark on the north side of the well casing. Then check for the presence of non-aqueous phase liquid (NAPL) using an oil/water interface probe. If NAPL is detected with the interface probe, confirm its presence/thickness by using a dedicated bailer to make a visual observation, record the information on the AKRF well sampling log, and call the Project Manager. Groundwater samples will generally not be collected from wells containing measurable NAPL, but samples of the NAPL may be analyzed—check with the Project Manager. Use the water level and total well depth measurements to calculate the mid-point of the water column within the screened interval.

  For example, for a well where the total depth is 16 feet, the depth to water is 7 feet and the screened interval is 5 to 15 feet, the mid-point of the water column within the screened interval would be 11 feet. The sediment sump is 15 to 16 feet. Record all of this information (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume), physical characteristics (e.g., odors or sheen), and general observations on the well sampling log and/or in the field book (see Attachment C for a well sampling log example). The well volume conversion factor (linear feet of water to gallons) is 0.041 x Water Column (WC) for 1-inch diameter wells, 0.16 x WC for 2-inch diameter wells, and 0.65 x WC for 4-inch diameter wells. Record the measurements on the well sampling log.

- There are many types of groundwater pumps that can be used to purge (and sample). The appropriate pump to be used will depend upon the well depth, diameter, and depth to water. Submersible or peristaltic pumps are generally preferred. A submersible pump can almost always be used, but will generally be required when the depth to water is greater than 20 feet, and/or when the well diameter is greater than two inches (check with AKRF Project Manager/work plan to see which pump is preferred). A peristaltic pump may be necessary when field conditions render a submersible pump impractical, such as a small water column or the presence of NAPL recovery pumps. In certain cases, and only with approval by the Project Manager, a dedicated bailer may be used. Connect dedicated tubing to the appropriate pump and lower it so that the pump intake is at the mid-point of the water column within the screened interval. Connect the pump to either a car battery or standalone marine battery and activate. Care should be taken so that a low yield well does not drawdown to such an extent that the well goes dry. Measure the depth to water during this process to prevent the well from going dry; however, if the well goes dry, the water that comes in the well as it recharges will be sampled. Pump the purge water into 5-gallon buckets.

- Measure the depth to water within the well. When using a peristaltic pump, the pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. Note, that some submersible pumps do not allow for the flow rate to be adjusted during purging (confirm before going into the field). The well purging rate should be adjusted so as to produce a smooth, constant (laminar) flow and so as not to produce excessive turbulence in the well. Depth to water measurements should be taken periodically (i.e., every five minutes) to ensure the well drawdown does not exceed 0.3 feet and/or go dry. If this is the case, contact the Project Manager for further direction. Record any changes in flow rate on the well sampling log.

- Only use a bailer if hydraulic characteristics, depth, and/or recharge rate of the well render the pumps impractical (check with the Project Manager prior to using a bailer). Attach a string to the top of the bailer (preferred bailer diameter depends on well diameter) and slowly lower it into the well to prevent aeration of the groundwater. Bail the well from the top of the water column to the bottom. When the bailer is full, carefully transfer the contents into a 5-gallon bucket.

- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and specific conductivity) with measurements collected approximately every five minutes. Pump should be kept stable during purging so water is not agitated. Record measurements on the well sampling log.
- In some cases, where wells are difficult to access or the well volume is too small for a pump (microwells), a check-valve lift pump may be used. A foot valve is attached to the bottom of semi-rigid tubing and lowered into the well. The tubing is then moved up and down at a constant rate to allow water to flow through the column of tubing. Pump the purge water into 5-gallon buckets.
- Transfer purged water from the 5-gallon buckets into properly labeled 55-gallon drums designated for well-purge water (for drum labeling procedures, see SOP #H-SI-13, Investigation Derived Waste). Water may be discharged to the ground surface or groundwater providing the water meets or is treated to meet certain qualitative or analytical criteria. Check with the Project Manager prior to discharging any water to the ground surface.
- Once the correct volume of water is removed [typically three to five well volumes or until turbidity is less than 50 nephelometric units (NTUs) for three consecutive readings that are five minutes apart], the well can be sampled (check the work plan or confirm with the Project Manager prior to mobilizing). If pumping is the preferred method of sampling, the pump should be kept stable during sampling so the groundwater is not agitated. The total volume of water removed and the sample time should be recorded on the log.
- Collect groundwater samples directly from the discharge end of the tubing or bailer into the required labeled sample containers and place in a chilled cooler. Samples should be collected first for volatile organic compounds (VOCs), then for semivolatile organic compounds (SVOCs), and then for the remaining analytes.
- Some analyses require sample containers to be pre-preserved by the laboratory. Caution should be used in handling pre-preserved sample containers, as concentrated acids are often used as a preservation agent.
- Some sample analyses require field filtering prior to shipment (check with the Project Manager and/or laboratory to confirm). If a sample needs to be field filtered, insert the discharge end of the tubing into the inlet of a dedicated and disposable 0.45 micron field filter (follow the etched directional flow arrow on the field filter), then collect your sample from the outlet of the filter.
- In addition to laboratory analysis of the collected samples, additional analyses may be required for quality control measures. These samples may include trip blanks, field blanks (also known as equipment blanks or rinsate blanks), matrix spike/matrix spike duplicates (MS/MSD), and blind duplicate samples. Trip blanks are typically analyzed for VOCs only and do not require collection. Other QA/QC samples are typically analyzed for the same parameters as the collected samples. The samples that may be analyzed for quality control measures are further described below:
    1. The pre-filled trip blanks, supplied by the laboratory, accompany the glassware into the field, then back to the laboratory and should not be opened in the field. Typically, one trip blank is submitted with each cooler that contains VOC samples. Confirm the frequency with the Project Manager, or site-specific work plan or QAPP.
    2. For certain New York State Department of Conservation (NYSDEC)-regulated projects (e.g., State VCP, BCP and IHWS/State Superfund), field duplicates, matrix spike/matrix spike duplicates (MS/MSDs), and field blanks will likely be required.

3. Duplicate and MS/MSD sample containers should be filled alternately between the original samples by parameter (i.e. collect all VOC samples, then all SVOC samples, etc.). Where possible, these QA/QC samples should be collected from a more contaminated well; however, please confirm the conventions for each specific site.
4. The field blank (equipment rinsate blank) should be prepared using laboratory-supplied water; however, store-bought distilled water may be used if necessary. Water shall be pumped through the decontaminated pump into the sample containers. This sample should be collected after the sample collection and decontamination is complete at a given well, and analyzed for the same parameters as the collected samples.

- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during any subsequent sampling event (e.g., next round of quarterly groundwater sampling). Dispose of the sample filter (if field filtering), PPE, bailer, surplus tubing, and other disposable sampling materials appropriately (see SOP #H-SI-13, Investigation Derived Waste).
- Decontaminate the non-dedicated sampling equipment (pump, oil/water interface probe, turbidity meter). Refer to SOP #H-SI-12 for decontamination procedures.

Field personnel will be responsible for maintaining the sample coolers in a secure location until they are picked up and/or sent to the laboratory. Ice should be added to the coolers prior to collecting samples for proper sample preservation. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on chain-of-custody (COC) forms (see Attachment A for an example COC). The COC forms will contain, at a minimum, the following information: project name; names of sampling personnel; sample ID; date and time of collection and matrix; signatures of individuals involved in the sample transfer; and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

7.0 REFERENCES

1. U.S. Environmental Protection Agency Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers – May 2002
2. Well Volume Calculations **-** “Rite in the Rain” All-Weather Environmental No.550F

ATTACHMENT A:
EXAMPLE LABORATORY CHAIN OF CUSTODY

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

CHAIN OF CUSTODY

460-84689 Chain of Custody

7 New Durham Road
ison, New Jersey 08817
one: (732) 549-3900 Fax: (732) 549-3679

Name (for report and invoice): Eric Park
Samplers Name (Printed): Jessica Mathew
Site/Project Identification: 2350 Fifth Avenue
Company: AKRF, Inc.
P. O. #: 08010-0024
State (Location of site): NJ: ☐ NY: ☒ Other:
Regulatory Program:
Address: 440 Park Ave 7th floor
City: New York State: NY
Phone: (646) 388-9532 Fax: N/A

Analysis Turnaround Time: Standard ☒
Rush Charges Authorized For: 2 Week ☐ 1 Week ☐ Other ☐

ANALYSIS REQUESTED (ENTER "X" BELOW TO INDICATE REQUEST): VOCs - EPA Method 8260

LAB USE ONLY
Project No:
Job No: 84689

Sample Identification	Date (m/d/y)	Time	Matrix	No. of Cont.	VOCs - EPA Method 8260	Sample Numbers
M-7	10/15/14	1255	GW	3	X	-1
M-8	10/15/14	1557	GW	3	X	-2
M-2	10/16/14	1310	GW	3	X	-3
M-2A	↓	1315	GW	3	X	-4
M-3			GW	3	X	-5
M-3-MS			GW	3	X	~~-6~~ -5
M-3-MSD			GW	3	X	~~-7~~ -5
FB-101614	↓	1400	GW	3	X	~~-8~~ -6 Field Blank
TB-101614	NA	NA	GW	2	X	~~-9~~ -7 Trip Blank
M-1S	10/16/14	1030	GW	3	X	~~-10~~ -8

Preservation Used: 1 = ICE, 2 = HCl, 3 = H_2SO_4, 4 = HNO_3, 5 = NaOH, 6 = Other ______, 7 = Other ______
Soil:
Water: 29

Special Instructions: Category B Deliverables
Water Metals Filtered (Yes/No)? ______

Relinquished by	Company	Date / Time	Received by	Company
Jessica Mathew	AKRF, Inc	~~[illegible]~~	1)	
2)	AKRF, Inc.	10/16/14 / 1530	2)	T. A
3)	T. A	10/16/14 1720	3)	TA Edison
4)			4)	

5-Day RUSH

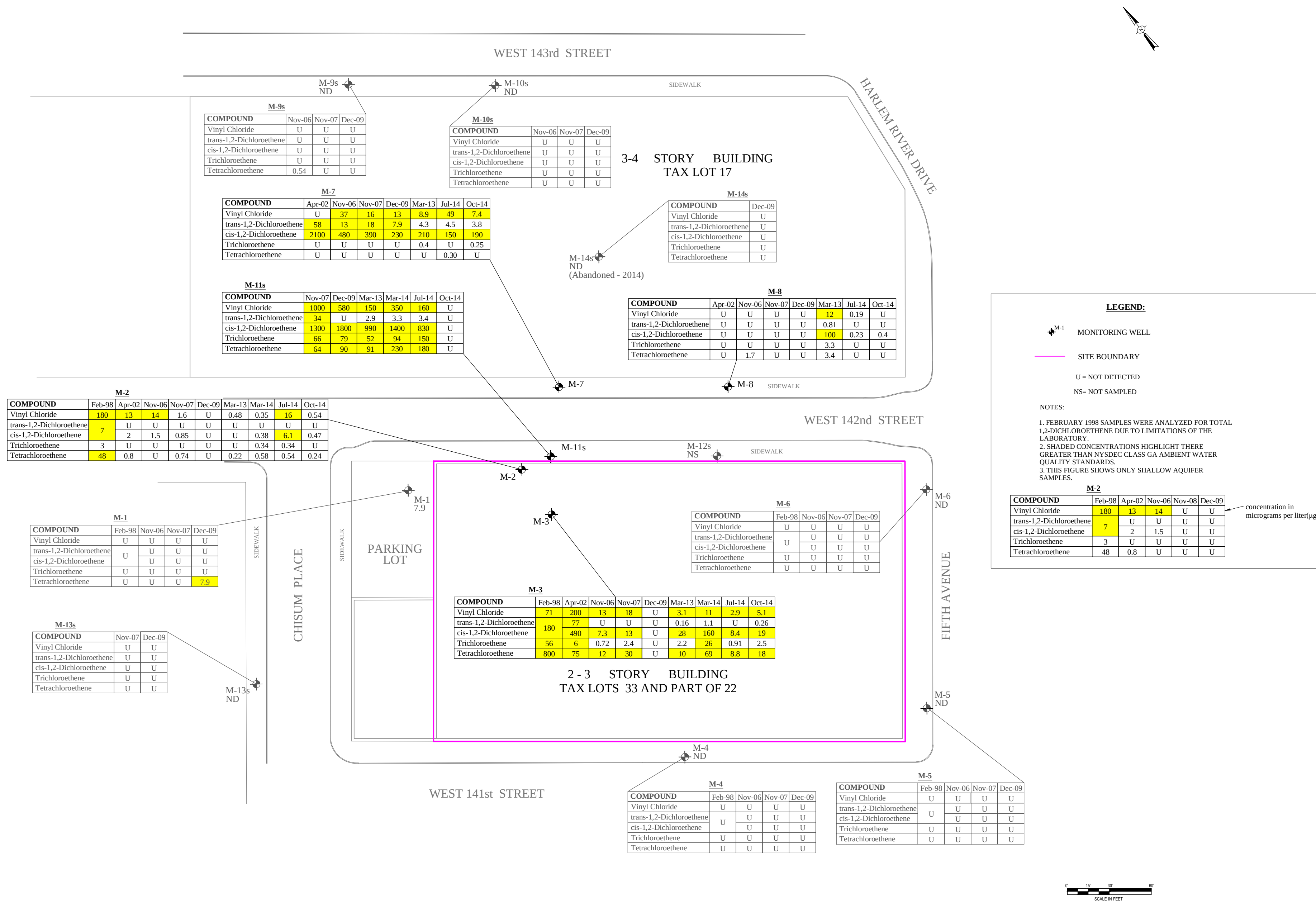
10/16/14

Laboratory Ce... Jersey (12028), New York (11452), Pennsylvania (68-522), Connecticut (PH-0200), Rhode Island (132).
Massachusetts (... ...orth Carolina (No. 578) 0.8/2.8 IR-1 ROE J

TAL-0016 (0408)

A20

ATTACHMENT B:
EXAMPLE FIGURE



M-9s

COMPOUND	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U
trans-1,2-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
Trichloroethene	U	U	U
Tetrachloroethene	0.54	U	U

M-10s

COMPOUND	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U
trans-1,2-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
Trichloroethene	U	U	U
Tetrachloroethene	U	U	U

M-7

COMPOUND	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Jul-14	Oct-14
Vinyl Chloride	U	37	16	13	8.9	49	7.4
trans-1,2-Dichloroethene	58	13	18	7.9	4.3	4.5	3.8
cis-1,2-Dichloroethene	2100	480	390	230	210	150	190
Trichloroethene	U	U	U	U	0.4	U	0.25
Tetrachloroethene	U	U	U	U	U	0.30	U

M-14s

COMPOUND	Dec-09
Vinyl Chloride	U
trans-1,2-Dichloroethene	U
cis-1,2-Dichloroethene	U
Trichloroethene	U
Tetrachloroethene	U

M-11s

COMPOUND	Nov-07	Dec-09	Mar-13	Mar-14	Jul-14	Oct-14
Vinyl Chloride	1000	580	150	350	160	U
trans-1,2-Dichloroethene	34	U	2.9	3.3	3.4	U
cis-1,2-Dichloroethene	1300	1800	990	1400	830	U
Trichloroethene	66	79	52	94	150	U
Tetrachloroethene	64	90	91	230	180	U

M-8

COMPOUND	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Jul-14	Oct-14
Vinyl Chloride	U	U	U	U	12	0.19	U
trans-1,2-Dichloroethene	U	U	U	U	0.81	U	U
cis-1,2-Dichloroethene	U	U	U	U	100	0.23	0.4
Trichloroethene	U	U	U	U	3.3	U	U
Tetrachloroethene	U	1.7	U	U	3.4	U	U

M-2

COMPOUND	Feb-98	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Mar-14	Jul-14	Oct-14
Vinyl Chloride	180	13	14	1.6	U	0.48	0.35	16	0.54
trans-1,2-Dichloroethene	7	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene		2	1.5	0.85	U	U	0.38	6.1	0.47
Trichloroethene	3	U	U	U	U	U	0.34	0.34	U
Tetrachloroethene	48	0.8	U	0.74	U	0.22	0.58	0.54	0.24

M-1

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	7.9

M-6

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	U

M-3

COMPOUND	Feb-98	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Mar-14	Jul-14	Oct-14
Vinyl Chloride	71	200	13	18	U	3.1	11	2.9	5.1
trans-1,2-Dichloroethene	180	77	U	U	U	0.16	1.1	U	0.26
cis-1,2-Dichloroethene		490	7.3	13	U	28	160	8.4	19
Trichloroethene	56	6	0.72	2.4	U	2.2	26	0.91	2.5
Tetrachloroethene	800	75	12	30	U	10	69	8.8	18

M-13s

COMPOUND	Nov-07	Dec-09
Vinyl Chloride	U	U
trans-1,2-Dichloroethene	U	U
cis-1,2-Dichloroethene	U	U
Trichloroethene	U	U
Tetrachloroethene	U	U

M-4

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	U

M-5

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	U

LEGEND:

MONITORING WELL

SITE BOUNDARY

U = NOT DETECTED

NS= NOT SAMPLED

NOTES:

1. FEBRUARY 1998 SAMPLES WERE ANALYZED FOR TOTAL 1,2-DICHLOROETHENE DUE TO LIMITATIONS OF THE LABORATORY.
2. SHADED CONCENTRATIONS HIGHLIGHT THERE GREATER THAN NYSDEC CLASS GA AMBIENT WATER QUALITY STANDARDS.
3. THIS FIGURE SHOWS ONLY SHALLOW AQUIFER SAMPLES.

M-2

COMPOUND	Feb-98	Apr-02	Nov-06	Nov-08	Dec-09
Vinyl Chloride	180	13	14	U	U
trans-1,2-Dichloroethene	7	U	U	U	U
cis-1,2-Dichloroethene		2	1.5	U	U
Trichloroethene	3	U	U	U	U
Tetrachloroethene	48	0.8	U	U	U

concentration in micrograms per liter(µg/l)

AKRF Engineering, P.C.
440 Park Avenue South, New York, N.Y. 10016

GROUNDWATER CONTAMINATION SUMMARY

2350 FIFTH AVENUE
NEW YORK, NEW YORK

DATE
11.11.2014

SCALE
as shown

PROJECT No.
08010

FIGURE
10

ATTACHMENT C:
EXAMPLE & MONITORING WELL SAMPLING LOG TEMPLATE

Standard Well Sampling Log

Job No:		**Client:**	**Well No:**
Project Location:		**Sampled By:**	
Date:		**Sampling Time:**	
PID at surface:			
Total Depth:	ft. below top of casing	**Water Column (WC):** feet	*= 0.041 * WC for 1" wells
Depth to Water:	ft. below top of casing	**Well Volume*:** gallons	*= 0.163 * WC for 2" wells
Depth to Product:	ft. below top of casing	**Volume Purged:** gallons	*= 0.653 * WC for 4" wells
		Well Diam.: inches	*= 1.469 * WC for 6" wells
Depth to top of screen:	ft. below top of casing		Target flow rate is 100 ml/min
Depth to bottom of screen:	ft. below top of casing	**Purging Device (pump type):**	
Approx. Pump Intake:	ft. below top of casing		

Time	Depth to Water (Ft.)	Purge Rate (ml/min)	Turbidity (NTU)	Temp (^{o}C)	Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Comments (problems, odor, sheen)

Groundwater samples analyzed for:

AKRF

Standard Well Sampling Log

Job No:	12184	**Client:**	AC Affordable Housing LLC	**Well No:**
Project Location:	275 Chestnut Street, Brooklyn, New York	**Sampled By:**	W. Grossett, AKRF	
Date:	12/8/2017	**Sampling Time:**	15:35	**L3-RI-MW-8**
PID at surface:	22.50 ppm			
Total Depth:	20.25 ft. below top of casing	**Water Column (WC):**	6.03 feet	*= 0.041 * WC for 1" wells
Depth to Water:	14.22 ft. below top of casing	**Well Volume*:**	0.98 gallons	*= 0.163 * WC for 2" wells
Depth to Product:	ND	**Volume Purged:**	3.5 gallons	*= 0.653 * WC for 4" wells
		Well Diam.:	2 inches	*= 1.469 * WC for 6" wells
Depth to top of screen:	10.25 ft. below top of casing			Target flow rate is 100 ml/min
Depth to bottom of screen:	20.25 ft. below top of casing	**Purging Device (pump type):**	Solinst Peristaltic (1/4" Tubing)	
Approx. Pump Intake:	17.25 ft. below top of casing			

Time	Depth to Water (Ft.)	Purge Rate (ml/min)	Turbidity (NTU)	Temp (°C)	Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Comments (problems, odor, sheen)
15:00	14.22	200	144	12.89	0.462	3.35	6.32	186	No sheen or odor observed on purge water.
15:05	14.25	200	65.6	14.65	0.402	3.32	6.19	93	
15:10	14.35	200	64.5	14.82	0.395	3.30	6.17	59	
15:15	14.50	200	62.2	15.01	0.390	3.18	6.15	41	
15:20	14.75	200	61.5	15.07	0.395	3.14	6.16	42	
15:25	14.78	200	60.7	15.08	0.396	3.05	6.15	50	
15:30	14.80	200	58.8	15.09	0.396	3.08	6.18	49	
SAMPLING									
15:40	14.82	200	57.5	15.00	0.397	3.07	6.17	55	

Groundwater samples analyzed for: VOCs by EPA Method 8260.

ND = not detected PID = photoionization detector ppm = parts per million ORP = oxidation reduction potential

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

LOW-FLOW GROUNDWATER SAMPLING

SOP#: H-SI-09

March 2018

Prepared By:

Name: Steven Grens Signature: ______________ Date: 3-1-18

Prepared By:

Name: Deborah Shapiro Signature: ______________ Date: 3-1-18

Approved By:

Name: Marc Godick Signature: ______________ Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: ______________ Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on how to perform low-flow purging and groundwater sampling, based on procedures described in the United States Environmental Protection Agency's (USEPA) Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers [EPA 542-S-02-001]. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

The purpose of low-flow groundwater sampling is to collect representative water samples under ambient flow conditions, with minimal physical and chemical alterations from sampling. The benefits of low-flow sampling include a reduction in the quantity of investigation derived waste (IDW) generated, as well as the collection of more representative groundwater samples than other methods.

Most New York State Department of Environmental Conservation (NYSDEC) and New York City Office of Environmental Remediation (NYCOER) sites require following the USEPA's low-flow sampling guidelines. This SOP will help ensure that the project's data quality objectives are met.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during low-flow groundwater sampling, as appropriate:

SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-06	Groundwater Monitoring Well Installation – Bedrock
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-08	Standard Groundwater Sampling
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional utilizing this SOP:

- Field Vehicle
- OSHA Level D PPE (e.g., Nitrile Gloves, Safety Glasses, Splash Guard, Coveralls, etc.)
- Photoionization Detector (PID) & Calibration Kit
- Keys to Wells
- Oil/Water Interface Probe
- QED Sample Pro Bladder Pump [Confirm the Well Diameter (1-inch vs. 2-inch) Prior to Ordering Low-Flow Sampling Equipment]

- Dedicated Poly Bladders for QED Bladder Pump
- Dedicated Polyethylene (Poly) Sample Tubing for Air/Water
- QED MP-50 Model Controller/Compressor
- Water Quality Meter (Horiba U-52 or YSI 6820)
- 12 Volt Marine Battery and Charger
- String/Twine
- Tool Kit (Ratchet Set, Hammer, Flat Head Screw Driver)
- 5-Gallon Bucket(s) and Lids for Purge Water
- 55-Gallon DOT-Approved Drum(s)
- Drum Labels
- Decontamination Supplies
- First Aid Kit with General Supplies
- Laboratory Supplied Sampling Jars
- Cooler(s) and Ice for Sample Shipment
- Digital Camera or Cellular Phone/Field Tablet with Digital Camera
- Permanent Marker
- Field Book
- Trash Bags
- Measuring Wheel/Tape
- Plastic Sheeting

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional using this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Proposal and/or Work Plan
- A Site-specific Quality Assurance Project Plan (QAPP), if applicable
- Chain of Custody (COC) (See Attachment A for an example COC)
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Monitoring Well Locations (See Attachment B for Figure Example)
- Previously Completed Monitoring Well Installation Logs (If Available)
- AKRF Low-Flow Well Sampling Log (see Attachment C for the Low-Flow Sampling Log Sheet Template and a completed example), to be completed during implementation of this SOP
- Related SOPs Listed in Section 3.0

6.0 LOW-FLOW GROUNDWATER SAMPLING PROCEDURES

All permanent and temporary monitoring wells must be developed at least one week prior to sampling (see SOP #H-SI-07, Monitoring Well Development) unless the Project Manager directs otherwise. Sampling will be conducted according to the following procedures:

- Don safety equipment, as required by the HASP.
- Locate the well using the scaled Figure/Maps/Drawings (see Attachment B for an example of a Figure showing groundwater monitoring well locations). Use a measuring wheel or other locating aid if necessary.
- Record site and monitoring well locations on the groundwater sampling log.

- Prepare the sampling area by placing plastic sheeting over the well. Cut a small hole in the sheeting to provide access to the well.
- Remove any cover and locking cap. Immediately after opening, measure the vapor concentrations in the well with a PID.
- Measure the total well depth and depth to water from the mark on the north side of the well casing. Then check for the presence of light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) using an oil/water interface probe. Record the information on your well sampling log and call the Project Manager if NAPL is detected. Groundwater samples will generally not be collected from wells containing measurable NAPL, but samples of NAPL may be analyzed—check with the Project Manager.

  Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. (For example, for a shallow well where the total depth is 16 feet, the screened interval is 5 to 15 feet, the sediment sump is 15 to 16 feet, and the depth to water is 7 feet, the mid-point of the water column within the screened interval would be 11 feet.) Record the measurements on the well sampling log.
- Connect dedicated tubing to either a submersible or bladder pump and lower the pump so that the intake is set at the mid-point of the water column, within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a multi-parameter meter (e.g., Horiba U-52, YSI 6820). Then, connect the tubing to the output of the cell and place the discharge end of the tubing in a 5-gallon bucket or other container.
- Connect the pump to either a car battery or a standalone marine battery and activate the pump at the lowest flow rate setting. Record the flow rate on your well sampling log.
- Measure the depth to water within the well. Control the pump flow rate (generally the rate should be between 100 and 500 milliliters per minute) so that the water level measurements do not change by more than 0.3 feet, as compared to the initial static reading. The well purging rate should be adjusted to produce a smooth, constant (laminar) flow, but should not produce excessive turbulence in the well. Care should be taken so that the well drawdown does not exceed 0.3 feet and/or go dry. Collect and record water level measurements every five minutes. If this is the case, contact the Project Manager for further direction. Record any changes in flow rate on the well sampling log.
- During purging, collect periodic groundwater samples and analyze for water quality indicators [e.g., turbidity, pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and specific conductivity] with measurements collected approximately every five minutes. The pump should be kept stable during purging to prevent agitation. Record all measurements on the well sampling log.
- Transfer purged water from the 5-gallon buckets into properly labeled 55-gallon drums designated for well-purge water (see SOP #H-SI-13, Investigation Derived Waste, for drum labeling procedures). Water may be discharged to the ground surface or groundwater providing the water meets or is treated to meet certain qualitative or analytical criteria. Check with the Project Manager prior to discharging any water to the ground surface.

- Continue purging the well until the water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Parameter	**Stabilization Criteria**
pH	+/- 0.1 pH units
Specific Conductance	+/- 3% MS/cm
Oxidation-reduction Potential	+/- 10 mV
Turbidity	< 50 NTUs
Dissolved Oxygen	+/- 0.3 mg/l

- If the water quality parameters do not stabilize within two hours, purging may be discontinued (call the Project Manager before discontinuation). Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described below.
  - After purging, disconnect the tubing from the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing into the required pre-labeled sample containers, which should then be place in a chilled cooler for transportation. Samples should be collected first for volatile organic compounds (VOCs), followed by semivolatile organic compounds (SVOCs) and then the remaining parameters.
- Some analyses require sample containers to be pre-preserved by the laboratory. Caution should be used in handling pre-preserved sample containers, as concentrated acids are often used as a preservation agent.
- Some sample analyses require field filtering prior to collection (check with the Project Manager and/or laboratory to confirm). If a sample needs to be field filtered, insert the discharge end of the tubing into the inlet of a dedicated and disposable 0.45 micron field filter (follow the etched directional flow arrow on the field filter), then collect your sample from the outlet of the filter.
- In addition to laboratory analysis of the collected samples, additional analyses may be required for quality control measures. These samples may include trip blanks, field blanks (also known as equipment blanks or rinsate blanks), matrix spike/matrix spike duplicates (MS/MSD), and blind duplicate samples. Trip blanks are typically analyzed for VOCs only and do not require collection. Other QA/QC samples are typically analyzed for the same parameters as the collected samples. The samples that may be analyzed for quality control measures are further described below:
  1. The pre-filled trip blanks, supplied by the laboratory, accompany the glassware into the field, then back to the laboratory and should not be opened in the field. Typically, one trip blank is submitted with each cooler that contains VOC samples. Confirm the frequency with the Project Manager, or site-specific work plan or QAPP.
  2. For certain regulated projects (e.g., NYSDEC, NJDEP, or PADEP programs)), field duplicates, matrix spike/matrix spike duplicates (MS/MSDs), and field blanks will likely be required.
  3. Duplicate and MS/MSD sample containers should be filled alternately between the original samples by parameter (i.e. collect all VOC samples, then all SVOC samples, etc.). Where possible, these QA/QC samples should be collected from a more contaminated well; however, please confirm the conventions for each specific site.

4. The field blank (equipment rinsate blank) should be prepared using laboratory-supplied water; however, store-bought distilled water may be used if necessary. Water shall be pumped through the decontaminated pump into the sample containers. This sample should be collected after the sample collection and decontamination is complete at a given well, and analyzed for the same parameters as the collected samples.

- Collect one final field sample and analyze for turbidity and water quality parameters (e.g., pH, temperature, DO, ORP, and specific conductivity).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter (if field filtering), PPE, and other disposable sampling materials appropriately.
- Decontaminate the non-dedicated sampling equipment (pump, water level indicator, oil/water interface probe, flow-through cell). Refer to SOP #H-SI-12 for decontamination procedures.
- Make sure all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume), physical characteristics (e.g., odors or sheen), and general observations are recorded on the well sampling log and/or in the project logbook (see Attachment C for a well sampling log example and the latest sampling log template). The well volume conversion factor (linear feet of water to gallons) is 0.041 x Water Column (WC) for 1-inch diameter wells, 0.16 x WC for 2-inch diameter wells, and 0.65 x WC for 4-inch diameter wells.

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. Ice should be added to the sample cooler(s) prior to collecting groundwater samples for proper sample preservation. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on chain-of-custody (COC) forms (see Attachment A for an example COC). The COC forms will contain the following information: project name; names of sampling personnel; sample ID; date and time of collection and matrix; signatures of individuals involved in the sample transfer; and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

7.0 REFERENCES

1. U.S. Environmental Protection Agency Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers – May 2002
2. U.S. Environmental Protection Agency Region 1; Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells – July 30, 1996 (Revised January 19, 2010).
3. Well Volume Calculations - “Rite in the Rain” All-Weather Environmental No.550F

**ATTACHMENT A:
EXAMPLE LABORATORY CHAIN OF CUSTODY**

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

CHAIN OF CUSTODY

460-84689 Chain of Custody

7 New Durham Road
Edison, New Jersey 08817
Phone: (732) 549-3900 Fax: (732) 549-3679

Name (for report and invoice): Eric Park	Samplers Name (Printed): Jessica Mathews	Site/Project Identification: 2350 Fifth Avenue
Company: AKRF, Inc.	P. O. #: 08010-0024	State (Location of site): NJ: ☐ NY: ☒ Other:
		Regulatory Program:
Address: 440 Park Ave 7th floor	Analysis Turnaround Time: Standard ☒	LAB USE ONLY Project No:
City: New York State: NY	Rush Charges Authorized For: 2 Week ☐ 1 Week ☐ Other ☐	Job No: 84689
Phone: (646) 388-9532 Fax: N/A		

ANALYSIS REQUESTED (ENTER 'X' BELOW TO INDICATE REQUEST)

Sample Identification	m/d/y Date	Time	Matrix	No. of Cont.	VOCs - EPA Method 8260											Sample Numbers
M-7	10/15/14	1255	GW	3	X											-1
M-8	10/15/14	1557	GW	3	X											-2
M-2	10/16/14	1310	GW	3	X											-3
M-2A		1315	GW	3	X											-4
M-3			GW	3	X											-5
M-3-MS			GW	3	X											~~-6~~ -5
M-3-MSD			GW	3	X											~~-7~~ -5
FB-101614		1400	GW	3	X											~~-8~~ -6 Field Blank
TB-101614	NA	NA	GW	2	X											~~-9~~ -7 Trip Blank
M-11S	10/16/14	1030	GW	3	X											~~-10~~ -8

Preservation Used: 1 = ICE, 2 = HCl, 3 = H_2SO_4, 4 = HNO_3, 5 = NaOH — Soil: — Water: 29
6 = Other ______, 7 = Other ______

Special Instructions: Category B Deliverables — Water Metals Filtered (Yes/No)? ______

Relinquished by	Company	Date / Time	Received by	Company
Jessica Mathews	AKRF, Inc	~~10/16/14~~	1)	~~TA~~
2)	AKRF, Inc	10/16/14 / 1530	2)	T. A
3)	T. A	10/16/14 1720	3)	TA Edison
4)			4)	

5-Day RUSH

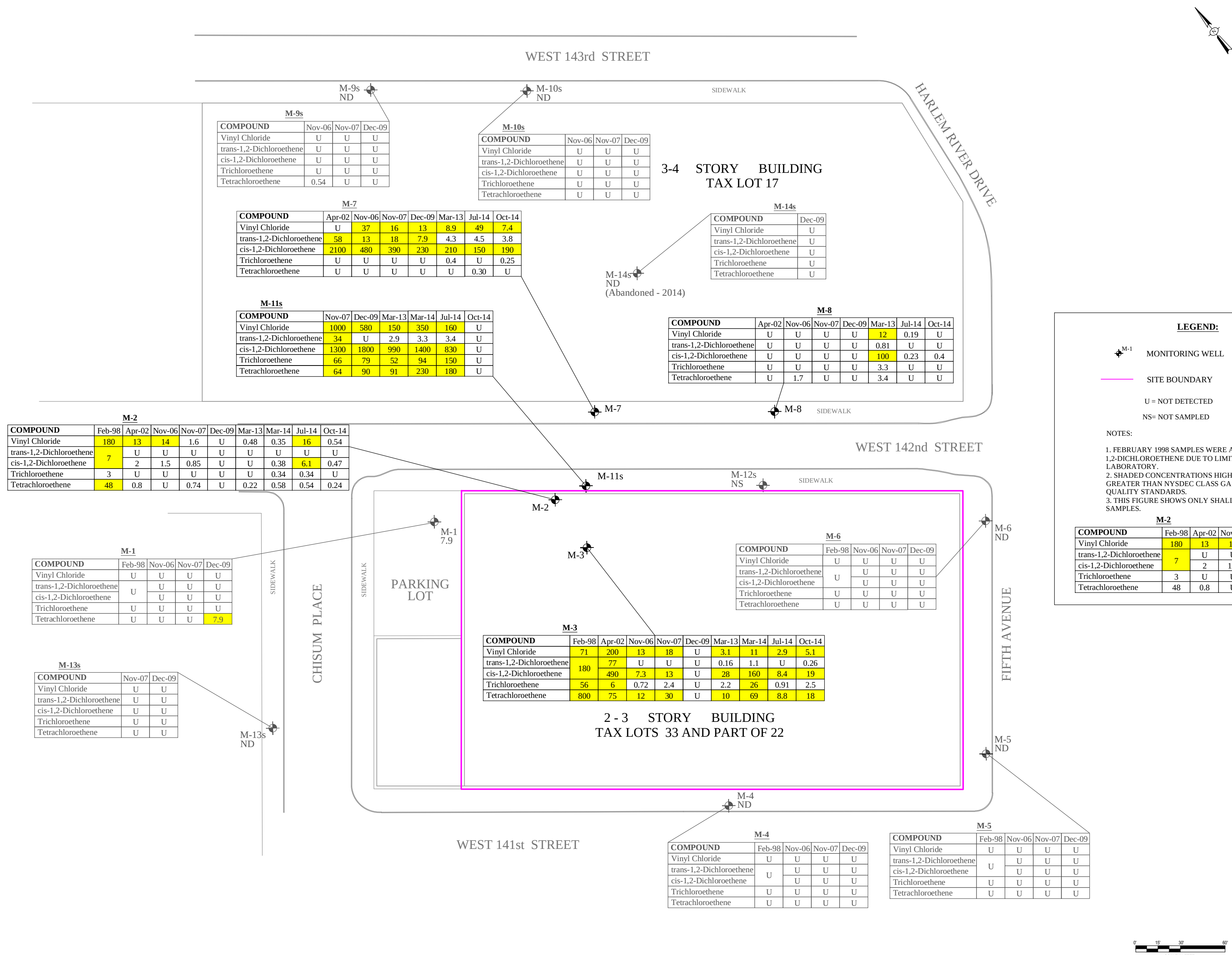
10/16/14

Laboratory Certifications: New Jersey (12028), New York (11452), Pennsylvania (68-522), Connecticut (PH-0200), Rhode Island (132).
Massachusetts (…), North Carolina (No. 578) 0.8/2.8 IR-1 Roes

TAL-0016 (0408)

A 20

ATTACHMENT B:
EXAMPLE FIGURE



M-9s

COMPOUND	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U
trans-1,2-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
Trichloroethene	U	U	U
Tetrachloroethene	0.54	U	U

M-10s

COMPOUND	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U
trans-1,2-Dichloroethene	U	U	U
cis-1,2-Dichloroethene	U	U	U
Trichloroethene	U	U	U
Tetrachloroethene	U	U	U

M-7

COMPOUND	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Jul-14	Oct-14
Vinyl Chloride	U	37	16	13	8.9	49	7.4
trans-1,2-Dichloroethene	58	13	18	7.9	4.3	4.5	3.8
cis-1,2-Dichloroethene	2100	480	390	230	210	150	190
Trichloroethene	U	U	U	U	0.4	U	0.25
Tetrachloroethene	U	U	U	U	U	0.30	U

M-14s

COMPOUND	Dec-09
Vinyl Chloride	U
trans-1,2-Dichloroethene	U
cis-1,2-Dichloroethene	U
Trichloroethene	U
Tetrachloroethene	U

M-11s

COMPOUND	Nov-07	Dec-09	Mar-13	Mar-14	Jul-14	Oct-14
Vinyl Chloride	1000	580	150	350	160	U
trans-1,2-Dichloroethene	34	U	2.9	3.3	3.4	U
cis-1,2-Dichloroethene	1300	1800	990	1400	830	U
Trichloroethene	66	79	52	94	150	U
Tetrachloroethene	64	90	91	230	180	U

M-8

COMPOUND	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Jul-14	Oct-14
Vinyl Chloride	U	U	U	U	12	0.19	U
trans-1,2-Dichloroethene	U	U	U	U	0.81	U	U
cis-1,2-Dichloroethene	U	U	U	U	100	0.23	0.4
Trichloroethene	U	U	U	U	3.3	U	U
Tetrachloroethene	U	1.7	U	U	3.4	U	U

M-2

COMPOUND	Feb-98	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Mar-14	Jul-14	Oct-14
Vinyl Chloride	180	13	14	1.6	U	0.48	0.35	16	0.54
trans-1,2-Dichloroethene	7	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene		2	1.5	0.85	U	U	0.38	6.1	0.47
Trichloroethene	3	U	U	U	U	U	0.34	0.34	U
Tetrachloroethene	48	0.8	U	0.74	U	0.22	0.58	0.54	0.24

M-1

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	7.9

M-6

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	U

M-3

COMPOUND	Feb-98	Apr-02	Nov-06	Nov-07	Dec-09	Mar-13	Mar-14	Jul-14	Oct-14
Vinyl Chloride	71	200	13	18	U	3.1	11	2.9	5.1
trans-1,2-Dichloroethene	180	77	U	U	U	0.16	1.1	U	0.26
cis-1,2-Dichloroethene		490	7.3	13	U	28	160	8.4	19
Trichloroethene	56	6	0.72	2.4	U	2.2	26	0.91	2.5
Tetrachloroethene	800	75	12	30	U	10	69	8.8	18

M-13s

COMPOUND	Nov-07	Dec-09
Vinyl Chloride	U	U
trans-1,2-Dichloroethene	U	U
cis-1,2-Dichloroethene	U	U
Trichloroethene	U	U
Tetrachloroethene	U	U

M-4

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	U

M-5

COMPOUND	Feb-98	Nov-06	Nov-07	Dec-09
Vinyl Chloride	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U
cis-1,2-Dichloroethene		U	U	U
Trichloroethene	U	U	U	U
Tetrachloroethene	U	U	U	U

LEGEND:

M-1 MONITORING WELL

SITE BOUNDARY

U = NOT DETECTED

NS= NOT SAMPLED

NOTES:

1. FEBRUARY 1998 SAMPLES WERE ANALYZED FOR TOTAL 1,2-DICHLOROETHENE DUE TO LIMITATIONS OF THE LABORATORY.
2. SHADED CONCENTRATIONS HIGHLIGHT THERE GREATER THAN NYSDEC CLASS GA AMBIENT WATER QUALITY STANDARDS.
3. THIS FIGURE SHOWS ONLY SHALLOW AQUIFER SAMPLES.

M-2

COMPOUND	Feb-98	Apr-02	Nov-06	Nov-08	Dec-09
Vinyl Chloride	180	13	14	U	U
trans-1,2-Dichloroethene	7	U	U	U	U
cis-1,2-Dichloroethene		2	1.5	U	U
Trichloroethene	3	U	U	U	U
Tetrachloroethene	48	0.8	U	U	U

concentration in micrograms per liter(µg/l)

AKRF Engineering, P.C.
440 Park Avenue South, New York, N.Y. 10016

2350 FIFTH AVENUE
NEW YORK, NEW YORK

GROUNDWATER CONTAMINATION SUMMARY

DATE **11.11.2014**

SCALE **as shown**

PROJECT No. **08010**

FIGURE **10**

ATTACHMENT C:
EXAMPLE & LOW-FLOW WELL SAMPLING LOG TEMPLATE

Low-Flow Well Sampling Log

Job No:	**Client:**	**Well No:**
Project Location:	**Sampled By:**	
Date:	**Sampling Time:**	
LEL at surface:		
PID at surface:		

Total Depth:	ft. below top of casing	**Water Column (WC):**	feet	*= 0.041 * WC for 1" wells
Depth to Water:	ft. below top of casing	**Well Volume*:**	gallons	*= 0.163 * WC for 2" wells
Depth to Product:	ft. below top of casing	**Volume Purged:**	gallons	*= 0.653 * WC for 4" wells
		Well Diam.:	inches	*= 1.469 * WC for 6" wells
Depth to top of screen:	ft. below top of casing			Target maximum flow rate is 100 ml/min
Depth to bottom of screen:	ft. below top of casing	**Purging Device (pump type):**		
Approx. Pump Intake:	ft. below top of casing			

Time	**Depth to Water** (Ft.)	**Purge Rate** (ml/min)	**Temp** (^{o}C)	**Conductivity** (mS/cm)	**DO** (mg/L)	**pH**	**ORP** (mV)	**Turbidity** (NTU)	**Comments** (problems, odor, sheen)
Stabilization Criteria:				**+/- 3 mS/cm**	**+/- 0.3 mg/L**	**+/- 0.1 pH units**	**+/- 10 mV**	**<50 NTU**	If water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, discontinue purging and collect sample.

Groundwater samples analyzed for:

ND = not detected PID = photoionization detector ppm = parts per million ORP = oxidation reduction potential

Groundwater Monitoring Well Sampling Log

AKRF Job No:	12184	**Client:**	Atlantic Chestnut Affordable Housing LLC	**Groundwater Monitoring Well ID:** L3-RI-MW-2
Project Location:	275 Chestnut Street, Brooklyn, New York	**BCP Project Name:**	Atlantic Chestnut - Lot 3	
Date:	12/8/2017	**BCP Project Number:**	C224236	
PID at surface:	307.9 ppm	**Sampled By:**	W. Grossett, AKRF	
Total Depth:	34.93 feet below top of casing	**Sampling Time:**	15:35	*= 0.163 * WC for 2" wells
Depth to Water:	31.65 feet below top of casing	**Water Column (WC):**	3.28 feet	*= 0.653 * WC for 4" wells
Depth to Product:	ND	**Well Volume*:**	0.53 gallon	*= 1.469 * WC for 6" wells
Depth to top of screen:	26.20 feet below top of casing	**Volume Purged:**	1.05 gallons	Target maximum flow rate is 100 mL/min
Depth to bottom of screen:	36.20 feet below top of casing	**Well Diameter:**	2 inches	
Approximate Pump Intake:	33 feet below top of casing	**Purging Device (pump type):**	QED MP-50	

Time	Depth to Water (feet)	Purge Rate (mL/min)	Turbidity (NTU)	Temp (^oC)	Conductivity (mS/cm)	DO (mg/L)	pH	ORP (mV)	Comments (problems, odor, sheen)
15:00	31.65	100	91	12.89	0.462	0.00	6.32	186	No sheen or odor observed on purge water.
15:05	31.65	100	15.1	14.65	0.402	0.00	6.19	93	
15:10	31.65	100	0.0	14.82	0.395	0.00	6.17	59	
15:15	31.65	100	0.0	15.01	0.390	0.00	6.15	41	
15:20	31.65	100	0.0	15.07	0.395	0.00	6.16	42	
15:25	31.65	100	0.0	15.08	0.396	0.00	6.15	50	
15:30	31.65	100	0.0	15.09	0.396	0.00	6.18	49	
SAMPLING									
15:40	31.65	100	0.0	15.00	0.397	0.00	6.17	55	
Stabilization Criteria:			**<50 NTU**		**+/- 3 mS/cm**	**+/- 0.3 mg/L**	**+/- 0.1 pH units**	**+/- 10 mV**	If water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, discontinue purging and collect sample.

Groundwater samples analyzed for PFOAs/PFOS by Modified EPA Method 537 and 1,4-Dioxane by EPA Method 8260C SIM.

ND = not detected PID = photoionization detector ppm = parts per million ORP = oxidation reduction potential

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

DECONTAMINATION

SOP#: H-SI-12

March 2018

Prepared By:

Name: Steve Grens Signature: ______ Date: 3-1-18

Prepared By:

Name: Asya Bychkov Signature: Asya Bychkov Date: 3-1-18

Approved By:

Name: Michelle Lapin Signature: ______ Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: ______ Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Professionals on decontamination procedures for field equipment and personal protective equipment. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

Proper decontamination procedures are necessary to protect human health and the environment, and to prevent cross-contamination when collecting samples.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during decontamination, as appropriate:

SOP #H-SI-03	Soil Boring Oversight and Sampling
SOP #H-SI-04	Test Pit Oversight and Sampling
SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-06	Groundwater Monitoring Well Installation – Bedrock
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-08	Standard Groundwater Sampling
SOP #H-SI-09	Low-Flow Groundwater Sampling
SOP #H-SI-10	Soil Vapor Sampling
SOP #H-SI-11	Indoor Air Sampling
SOP #H-SI-13	Investigation Derived Waste

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and decontamination supplies may be required for the AKRF Field Professional utilizing this SOP:

- OSHA Level D PPE
- Nitrile Gloves
- Decontamination Supplies (e.g., Simple Green, tap water, buckets, and scrub brush)
- Collection Equipment for Contingent Soil or Groundwater Sampling
- Permanent Marker and Field Book
- Drum Labels
- Oil Absorbent Pads and/or Booms

5.0 DOCUMENT LIST

The following documents may be required:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-Specific Work Plan and/or Proposal
- A Site-specific Quality Assurance Project Plan (QAPP)
- Related SOPs Listed in Section 3.0

6.0 DECONTAMINATION PROCEDURES

Decontamination is important for personnel safety and preventing cross-contamination of collected samples. The recommend procedures are provided below:

6.1 Avoiding Problems

Personnel hygiene (including not eating or drinking), coupled with diligent decontamination, will significantly reduce the potential for exposure to contaminated material. During all site activities, personnel should attempt to minimize the degree of contact with all soil/groundwater, especially known or potentially contaminated materials. All personnel should minimize kneeling, splash generation, and other physical contact with soil/groundwater. This conscientious effort to keep "clean" during site activities may also reduce the generation of waste and the degree of decontamination required.

Gloves worn during sampling should be changed between each sample location to reduce the possibility of cross-contamination and contaminant break-through.

Field decontamination procedures should be performed to reduce runoff and to ensure that people nearby are not affected. Removing PPE should be performed at the edge of the exclusion zone (EZ), and non-reusable items should be placed in containers/trash cans within the contamination reduction zone (CRZ). Employees should wash their hands and face with soap and water and/or hand sanitizer after PPE removal. Brushes should also be used for removing mud/soil from boots prior to leaving the site.

6.2 Decontamination of Sampling Equipment

If possible, based on pre-sampling information, sampling should proceed from less contaminated to more contaminated areas to decrease the impact of any cross-contamination. All non-disposable sampling equipment (drilling rods and casing, macrocore samplers, probe rods and pumps, etc.) should be either dedicated or decontaminated between samples and/or sampling locations. The appropriate PPE (e.g., safety glasses, nitrile gloves, and coveralls) should be worn while conducting equipment decontamination.

The decontamination procedure should be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Repeat Step 1.
4. Rinse with distilled water.
5. Air-dry, if possible.

6. Decontamination will be conducted within or over plastic buckets, 55-gallon drums, or on plastic sheeting (or equivalent) bermed to prevent runoff. Procedures for the safe handling and disposal of investigation derived waste (IDW), including used wash water and rinse water, are included in SOP #H-SI-13.

6.3 Heavy Equipment Decontamination

Decontamination of heavy equipment (e.g., augers, excavator buckets) must be performed between sampling locations and prior to removal from the site using high-pressure steam or dry decontamination with brushes and shovels. Decontamination will take place on a decontamination pad, established in close proximity to the EZ, and all liquids used in the decontamination procedure will be collected for disposal as IDW per SOP #H-SI-13. Vehicles or equipment brought into the EZ will be treated as contaminated, and will be decontaminated prior to removal. Appropriate PPE must be worn while conducting heavy equipment decontamination.

6.4 Emergency Decontamination in Case of Injury

If circumstances dictate that contaminated clothing cannot be readily removed (e.g., due to injury), then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or equipment. If the injured person can be safely moved (unless contamination is extreme or is the cause of the injury, it is likely better to not move the injured person if they may have back/head/neck injuries), he/she will be moved to the EZ boundary and decontaminated by site personnel before emergency responders handle the victim. If the person cannot be moved because of the injury (e.g., a suspected back, head, or neck injury), provisions shall be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric or other conditions. If the potential for inhalation hazards exists, such as with an open excavation, this area will be covered with plastic (polyethylene) sheeting or backfilled to eliminate potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person’s condition, potential contaminants, and provided with all pertinent chemical data related to the site-specific contaminants of concern.

6.5 Recordkeeping

Equipment cleaning and decontamination will be noted in the field book. Information will include the following:

- The type of equipment cleaned;
- The decontamination location;
- Any deviations from this SOP;
- Any use of solvents; and
- Type/source of water used for decontamination.

Any unusual field conditions that would impede decontamination procedures or limit the efficiency of decontamination or sample collection should be noted in the field book. A sketch of the decontamination area(s), quantities of decontamination waste water, and drum staging areas should also be included in the field book.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

INVESTIGATION DERIVED WASTE

SOP#: H-SI-13

March 2018

Prepared By:

Name: Ashutosh Sharma Signature: __________ Date: 3-1-18

Prepared By:

Name: Steve Grens Signature: __________ Date: 3-1-18

Approved By:

Name: Michelle Lapin Signature: __________ Date: 3-1-18

Approved By:

Name: Marcus Simons Signature: __________ Date: 3-1-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECIVE

This standard operating procedure (SOP) addresses the management of investigation-derived waste (IDW)—e.g., waste generated during investigations, other sampling, remedial work and/or operation and maintenance (O&M). These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other site-specific factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

IDW must be handled in a particular manner to protect human health and the environment, and to be compliant with applicable rules and regulations. The transportation, storage, and disposal of IDW is subject to regulation (e.g., 6 NYCRR Parts 360, 364 and 370 series). The New York State Department of Environmental Conservation (NYSDEC) DER-10 *Technical Guidance for Site Investigation and Remediation* should be consulted for additional guidance.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific work plan, Health and Safety Plan (HASP), and/or Quality Assurance Project Plan (QAPP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during the management of IDW, as appropriate:

SOP #H-SI-02	Soil Classification and Logging
SOP #H-SI-03	Soil Boring Oversight and Sampling
SOP #H-SI-04	Test Pit Oversight and Sampling
SOP #H-SI-05	Groundwater Monitoring Well Installation – Overburden
SOP #H-SI-06	Groundwater Monitoring Well Installation – Bedrock
SOP #H-SI-07	Monitoring Well Development
SOP #H-SI-08	Standard Groundwater Sampling
SOP #H-SI-09	Low-Flow Groundwater Sampling
SOP #H-SI-10	Soil Vapor Sampling
SOP #H-SI-12	Decontamination

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is also required, at a minimum, for the AKRF Field Professional utilizing this SOP:

- OSHA Level D PPE
- Nitrile Gloves
- DOT-Approved 55-Gallon Drum with Locking Lid (or Equivalent)
- Drums Labels (Non-Hazardous, Pending Analysis, and Hazardous Labels)
- Contractor Bags
- Spill Containment Pallet (if Applicable)
- Permanent Marker and Field Book
- Caution Tape

- Spray Paint
- Photoionization Detector (PID) & Calibration Kit
- Digital Camera or a Device with Digital Camera

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional using this SOP:

- AKRF Company-wide and/or Site-specific HASP
- A Quality Assurance Project Plan (QAPP)
- Related SOPs Listed in Section 3.0

6.0 MANAGEMENT OF INVESTIGATION DERIVED WASTE

6.1 Soil

Drill cuttings and spoils generated, for example, during the installation of borings should be considered contaminated unless field observations (screening with a PID and visual inspection) and/or prior analytical testing results or other information suggest otherwise. Contaminated soil should be placed on poly sheeting as it is generated; however, it may need to be subsequently containerized in Department of Transportation (DOT)-approved 55-gallon drums and labeled accordingly (pending sampling results).

Overnight storage of contaminated soil outside of a container is not allowed unless stored on and covered with poly sheeting. Drum(s) should be sealed at the end of each work day and labeled with the date, well, or boring number(s), type of waste (i.e., drill cuttings, development water, or purge water), project name and address, and the name and contact information of the AKRF point-of-contact (see Attachment A for an example drum label). Drums should be staged in a secure, locked area, away from public access to the extent practicable to avoid the likelihood of damage. Coordinate the drum staging area location with the site owner/client prior to starting field work.

If no visible or olfactory indications of contamination are noted and PID readings are not observed above background conditions, the soil may be replaced within the borehole where it was generated and surface-sealed with concrete, asphalt, or bentonite, to match surrounding grade. If the borehole is in an area of exposed soil, plug the hole with hydrated bentonite.

6.2 Groundwater

Investigation generated water/fluid (e.g., from well installation, development, purging, or sampling) must be handled as follows:

1. If there are no visible signs or other evidence of contamination (e.g., sheen, odors, free-phase product, and/or PID readings or data from previous sampling), it may be possible that water can be discharged to the ground surface, unless otherwise addressed in a site-specific work plan. However, check with the Project Manager prior to disposing in this manner.
2. If a remedial treatment system designed to treat water is operational at the site, the water may be suitable to be added to the influent of the treatment system. Check with the Project Manager.
3. All water not addressed by the previous two items must be containerized in DOT-approved 55-gallon drums (separately from soil cuttings), labeled accordingly (see Soil section above),

and staged in a secure area pending sampling and off-site disposal at an appropriate receiving facility. Water from different wells/sources may be combined in drums, provided they will be sent to the same disposal site.

4. When storing hazardous waste, secondary containment must be used if the site is located over a sole source aquifer (i.e., Queens and Long Island).

6.3 Remedial O&M Waste

Remedial O&M waste (e.g., condensate water or spent granular activated carbon) will be managed per item 3 above.

6.4 PPE and Decontamination Wash Water

Grossly contaminated PPE (e.g., nitrile gloves and coveralls) and disposable sampling equipment must be containerized in 55-gallon DOT-approved drums pending off-site disposal at the appropriate receiving facility. PPE and dedicated sampling equipment may be placed in the municipal trash if there is no evidence of contamination on the equipment; however, if there is no evidence of contamination but the waste was generated at an area of known contamination, it must be containerized as if contaminated.

7.0 REPORTING AND DOCUMENTATION

After a drum (or other approved IDW storage container) is properly labeled and staged in a secure area, an identification number should be spray painted on the side of the drum/container. See Attachment A for reference. The drum number, contents, status (e.g., full or approximate percentage full), date of generation, and drum staging area location should be recorded in the field book.

ATTACHMENT A:
EXAMPLE DRUM LABEL

THIS CONTAINER

10/31/16 ON HOLD

PENDING ANALYSIS

DRUM # 1

ON HOLD

CONTENTS PURGE WATER (FOR GROUNDWATER)
OR
CONTAMINATED SOIL

ORIGIN OF MATERIALS GROUNDWATER OR SOIL SAMPLING

ADDRESS 810 FULTON St, BROOKLYN, NY

CONTACT ASHUTOSH SHARMA (646-388-9865)
c/o AKRF, Inc, NY, NY

DO NOT TAMPER WITH CONTAINER
AUTHORIZED PERSONNEL ONLY

www.accuform.com • reorder# MHZW26

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

DOCUMENTATION

SOP#: H-FW-01

May 2017

Prepared By:

Name: Amy Jordan Signature: ________________ Date: 5-1-17

Prepared By:

Name: Rebecca Kinal Signature: ________________ Date: 5-1-17

Approved By:

Name: Marc Godick Signature: ________________ Date: 5-1-17

Approved By:

Name: Marcus Simons Signature: ________________ Date: 5-1-17

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) should be used to create and maintain proper documentation of all field work for reporting and legal reasons. This SOP generally applies to all field work conducted outside of the office; however, SOPs for specific work should be consulted in conjunction with this document for specific and pertinent documentation details.

2.0 SCOPE AND APPLICATION

Proper field documentation and maintenance of field records are critical components of our work. The documentation not only provides a legal record of our work, but is also an important reference for maintaining data and passing on knowledge for on-going projects. Field documentation generally includes, but is not limited to, the following: bound field books; photographs; Health and Safety Plan (HASP) affidavits; loose-leaf logs and forms; chains of custody; marked-up figures, sketches, as-built drawings, etc.; and manifests and tickets. All activities will be conducted in conformance with AKRF's company-wide and/or site-specific HASP.

These instructions are standard (i.e., typically applicable) operating procedures that may be varied or changed as required, depending on the specific documentation requirements or protocols for the project (e.g., use of a field tablet instead of a log book).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

Applicable SOPs should also be utilized or cross-referenced during documentation, depending on the type(s) of work being documented.

4.0 EQUIPMENT LIST

The following equipment is required, at a minimum, for the AKRF Field Professional utilizing this SOP:

- Permanent Marker/Pen and Project Field Book (site-specific, if available)
- Digital Camera or Device with Digital Camera
- Mobile Phone

5.0 DOCUMENT LIST

The following documents are required, at a minimum, while using this SOP:

- AKRF Company-wide and/or Site-specific HASP
- Related SOPs (as applicable)
- Project-specific Field Log Forms (as applicable)

6.0 FIELD BOOK SET UP

Field book entries should be of sufficient detail that a complete daily record of significant events, observations, and measurements is obtained. The field log book provides a legal record of the activities conducted at the site. Accordingly:

- Project-specific field books should be use when possible. Use the smaller, stapled field books for smaller jobs;
- Project-specific field books will be assigned a unique identification number. Before numbering a book, be mindful of potential earlier site work;
- Field books will be bound with consecutively numbered pages;
- Field books will be controlled by the AKRF Field Team Leader while field work is in progress;
- Entries will be written with waterproof ink;
- Entries will be signed and dated at the conclusion of each day of fieldwork;
- Corrections made to erroneous entries while fieldwork is in progress will be corrected by the person that made the original entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction;
- Corrections made after departing the field will be made by the person who made the original entries or by the Project Manager. Corrections will be made by drawing a line through the error, entering the correct information, and initialing and dating the time of the correction;
- If pages are added into field book, glue them (do not attach with staple or paper clip); and
- Maintain a list of important site contacts in the field book—inside the cover for smaller jobs or on the final pages of the field book for larger jobs (needing more space).

7.0 FIELD NOTES

At a minimum, daily field book entries should include the following information:

<u>Background and Objective:</u>

- Location of field activity;
- Date and time of arrival/departure on-site;
- Names and titles and company represented for field crew, site visitors and site contacts. Use initials only after the person's full name is entered;
- Weather information, for example: temperature, cloud coverage, precipitation, wind speed and direction;
- Equipment used by the contractor;
- Equipment used by AKRF, including calibration/zeroing of instruments, if applicable; and
- Purpose of field activity, referencing work plan if there is one.

Health and Safety:

- Documentation of tailgate health and safety discussion; and
- Confirmation that appropriate on-site personnel (e.g.; AKRF subcontractors) have signed the HASP affidavit.

Scope of Work:

- A detailed description of the field work conducted and all field observations;
- Sketch of site activities, if appropriate. Sketches should always include a north arrow, adjacent streets (with names), permanent objects, and work area (excavations, borings, etc.) locations with dimensions (with units) to triangulate distances from permanent objects;
- A recording of any delays with exact times and reasons (equipment malfunction, access issues, weather, etc.);
- References for all loose pages (e.g., boring logs, well development or sampling logs, marked up site plans, HASP training log, etc.) and photographs. Even if separate logs are used, record basic details like drilling start and end times and sample names in the field book;
- Sample collection details, including:
    - Sample media (soil, sediment, groundwater, etc.);
    - Number and volume of sample(s) taken;
    - Description of sampling point(s);
    - Volume of groundwater removed before sampling;
    - Preservatives used;
    - Analytical parameter(s);
    - Date and time of collection;
    - Sample identification number(s);
    - Sample distribution (e.g., laboratory);
    - Any field measurements made, such as pH, temperature, conductivity, water level, etc. (with all applicable units); and
    - Information pertaining to sample shipment, such as dates and method of shipments, chain-of-custody records, and the Federal Express air bill number, if applicable.
- Justification for and description of any deviation from the work plan.

8.0 DOCUMENT MAINTENANCE

8.1 Uploading Documentation

- All field documentation (including all items listed in Section 2.0) should be brought back to the office, scanned/downloaded, and saved electronically, as follows:
    - Field work lasting less than one week should be saved no later than the next business day after completing the field program.
    - Field work lasting more than one week should be saved electronically at the end of each work week.

- Laboratory chains-of-custody should be sent to the Project Manager no later than the same day of submittal to the laboratory. A legible photograph or scanned copy directly to the Project Manager is acceptable.
- The AKRF Project Manager will establish project-specific subdirectories for field work documentation. After scanning and saving to the appropriate location on the server, the file location information should be sent to the AKRF Project Manager via email.

8.2 Documentation Naming

Internal naming convention is for use in the project folder is as follows:

[job number]_[document type]_[document date]

- Job number: AKRF 5-digit project number
- Document type examples: “fieldnotes,” “GWlogs,” “trucklog,” “PHI_questionnaire,” “IAQ_inspection_log,” etc.
- Documentation date (yyyy-mm-dd[to dd]): This is the date the activity took place with a range of dates where applicable.

8.3 Photographs

- Photographs for each day should be downloaded to a separate subfolder named with the corresponding date (e.g., “photos yyyy-mm-dd”).
- Individual photos should be renamed as appropriate to describe the photograph content. Alternatively, a daily photographic log should be maintained in the project field book, or created electronically and saved to the appropriate subfolder.
- If the camera or device settings allow, all field photographs should be electronically date stamped.

8.4 Documentation Storage

All field books should be stored with the Project Manager at the end of the job, unless otherwise directed by the Project Manager.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

TANK ASSESSMENT

(not associated with closure activities)

SOP#: H-II-04

May 2017

Prepared By:

Name: Kenneth Wiles Signature: ______________ Date: 5-1-17

Prepared By:

Name: Axel Schwendt Signature: ______________ Date: 5-1-17

Approved By:

Name: Marc Godick Signature: ______________ Date: 5-1-17

Approved By:

Name: Marcus Simons Signature: ______________ Date: 5-1-17

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Field Professionals how to properly document the assessment of aboveground and underground petroleum (or other hazardous substance) storage tanks (ASTs and USTs). This SOP applies to non-intrusive investigations or assessments.

2.0 SCOPE AND APPLICATION

Documenting storage tank contents, construction materials, and associated features (such as piping, leak detection, overfill protection, and secondary containment) is important, as it may assist in determining the likelihood and/or location of a release. A leaking tank can also present the potential for fire and explosion hazards.

All activities will be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP), and this SOP.

These instructions are generally applicable but may need to be varied depending on site conditions, equipment limitations, or other factors. In all instances, the procedures ultimately employed should be documented.

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used or cross-referenced:

SOP #H-FW-01	Documentation
SOP #H-FW-02	Safety for Non-Intrusive Investigations
SOP #H-II-02	Phase I Site Visit
SOP #H-II-05	Geophysical Survey

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- Measuring Tape or Wheel
- Digital Camera or Phone/Tablet with Camera
- Permanent Marker and Field Book
- Water Finding Paste

5.0 DOCUMENT LIST

The following documents are required, at a minimum:

- Scaled Maps/Drawings
- Related SOPs listed in Section 3.0 above
- Available site-specific tank documentation (e.g., Phase I, PBS certificate, spill contingency plan)

6.0 TANK ASSESSMENT CHECKLIST

Obtain information (if available) about the tank(s) from field observations and discussions with site representatives. Complete the checklist provided as Attachment A, which is consistent with the NYSDEC PBS application (see Attachment B for reference).

7.0 RECORDS/DOCUMENTATION

Request any historical tank records which may consist of drawings, tank registration documents, tank tightness reports, inspection and gauging records, spill reports and closure documentation, etc. These may assist in determining the age, condition, and type of tank system.

8.0 TANK CONDITION ASSESSMENT

Condition assessments of UST systems are typically limited by their mostly buried nature. As such, the following applies primarily to AST systems, including the tanks, tank supports and foundations, secondary containment, product transfer areas, and piping. The assessment should include visual inspection (noting any constraints) of all visible system components (including piping and associated components such as boilers, generators, and pumps) for signs of deterioration, discharges, or accumulation of oil or other liquids, including catch pans and other similar items. The underlying or nearby floors, slabs, walls, and any secondary containment structures and/or vaults should also be inspected.

ATTACHMENT A:
TANK ASSESSMENT CHECKLIST

ATTACHMENT A
TANK ASSESSMENT CHECKLIST

Project: ____ Date: _______________

- ☐ Map location of tank and piping (if any) in field book. Measure from building or permanent site features.

Storage Tank Specifications

Tank Location

- ☐ Aboveground-Contact with Soil
- ☐ Aboveground-Contact with Impervious Barrier
- ☐ Aboveground on Saddle, Legs, Stilts, Rack, or Cradle
- ☐ Tank with 10% or More Underground
- ☐ Underground Including Vaulted with no Access for Inspection
- ☐ Aboveground in Vault with Access for Inspections

Tank Status

- ☐ In-Service
- ☐ Out-of-Service
- ☐ Closed-In Place
- ☐ Closed-Removed
- ☐ Tank Converted to Non-Regulated Use

Tank Contents Stored

Heating Oils

- ☐ #2 Fuel Oil
- ☐ #4 Fuel Oil
- ☐ #5 Fuel Oil
- ☐ #6 Fuel Oil
- ☐ Kerosene
- ☐ Clarified Oil
- ☐ Used Oil (Heating)

Motor Fuels

- ☐ Gasoline
- ☐ Gasoline/Ethanol
- ☐ Diesel
- ☐ Biodiesel
- ☐ Jet Fuel
- ☐ Jet Fuel (Biofuel)
- ☐ Aviation Gasoline

Lubricating/Cutting Oils
- ☐ Lube Oil
- ☐ Motor Oil
- ☐ Gear/Spindle Oil
- ☐ Hydraulic Oil
- ☐ Cutting Oil
- ☐ Transmission Fluid
- ☐ Turbine Oil
- ☐ Petroleum Grease

Oils Used as Building Materials
- ☐ Asphaltic Emulsions
- ☐ Form Oil

Petroleum Spirits
- ☐ White/Mineral Spirits
- ☐ Naphtha

Mineral/Insulating Oils
- ☐ Insulating Oil (e.g., Transformer, Cable Oil)
- ☐ Mineral Oil

Waste/Used/Other Oils
- ☐ Waste/Used Oil
- ☐ Other:_____________

Tank Consumption
- ☐ Onsite
- ☐ Resale/Redistribution

Tank Capacity: _________________Gallons

Tank Construction Type
- ☐ Steel/Carbon Steel/Iron
- ☐ Galvanized Steel Alloy
- ☐ Stainless Steel Alloy
- ☐ Fiberglass Coated Steel
- ☐ Steel Tank Encased in Concrete (concrete not secondary containment)
- ☐ Fiber Reinforced Plastic (FRP)
- ☐ Plastic
- ☐ Equivalent Technology
- ☐ Concrete
- ☐ Urethane Clad Steel
- ☐ Other:___________________

Tank Internal Protection

- ☐ None
- ☐ Epoxy Liner
- ☐ Rubber Liner
- ☐ Fiberglass Liner (FRP)
- ☐ Glass Liner
- ☐ Other:___________________

Tank External Protection

- ☐ None
- ☐ Painted/Asphalt/Coating
- ☐ Original Sacrificial Anode
- ☐ Original Impressed Current
- ☐ Fiberglass
- ☐ Jacketed
- ☐ Wrapped (Piping)
- ☐ Retrofitted Sacrificial Anode
- ☐ Retrofitted Impressed Current
- ☐ Urethane

Tank Secondary Containment

- ☐ None
- ☐ Diking (AST Only)
- ☐ Vault (With Access)
- ☐ Vault (Without Access)
- ☐ Double-Walled (UST Only)
- ☐ Synthetic Liner
- ☐ Remote Impounding Area
- ☐ Excavation Liner
- ☐ Modified Double-Walled (AST Only)
- ☐ Impervious Underlayment (AST Only)
- ☐ Double Bottom (AST Only)
- ☐ Double Walled (AST Only)
- ☐ Other:__________________

Tank Leak Detection

- ☐ None
- ☐ Interstitial Electronic Monitoring
- ☐ Interstitial Manual Monitoring
- ☐ Vapor Well
- ☐ Groundwater Well
- ☐ In-Tank System (Auto Tank Gauge)
- ☐ Impervious Barrier/Concrete Pad (AST Only)
- ☐ Statistical Inventory Reconciliation (SIR)
- ☐ Weep Holes in Vaults with no Access for Inspection
- ☐ Other:__________________

Overfill Protection

- ☐ None
- ☐ Float Vent Valve
- ☐ High Level Alarm
- ☐ Automatic Shut-Off
- ☐ Product Level Gauge (AST only)
- ☐ Vent Whistle
- ☐ Other:__________________

Spill Prevention

- ☐ None
- ☐ Catch Basin
- ☐ Spill Bucket at Fill Ports
- ☐ Other:__________________

Pumping/Dispensing Method

- ☐ None
- ☐ Pressurized Dispenser
- ☐ Suction Dispenser
- ☐ Gravity
- ☐ On-Site Heating System (Suction)
- ☐ On-Site Heating System (Supply/Return)
- ☐ Tank-Mounted Dispenser
- ☐ Loading Rack/Transfer Pump
- ☐ Submersible Pump(s) at Tank(s)
- ☐ Generator/Boiler Pump
- ☐ Day Tank Pump
- ☐ Other:__________________

Pump/Dispenser Secondary Containment
- ☐ None
- ☐ Drip Pan
- ☐ Spill Bucket
- ☐ Pump/Sump Below Pump/Dispenser
- ☐ Other:__________________

Piping Location
- ☐ No Piping
- ☐ Aboveground/On-ground
- ☐ Aboveground/Underground Combination

Piping Length: _________________Feet

Piping Construction Type
- ☐ None
- ☐ Steel/Carbon Steel/Iron
- ☐ Galvanized Steel
- ☐ Stainless Steel Alloy
- ☐ Fiberglass Coated Steel
- ☐ Steel Encased in Concrete
- ☐ Fiberglass Reinforced Plastic (FRP)
- ☐ Plastic
- ☐ Equivalent Technology
- ☐ Concrete
- ☐ Copper
- ☐ Flexible Piping
- ☐ Other:__________________

Piping Secondary Containment
- ☐ None
- ☐ Diking (AST Only)
- ☐ Vault (With Access)
- ☐ Double-Walled (UST Only)
- ☐ Remote Impounding Area
- ☐ Trench Liner
- ☐ Double-Walled (AST)
- ☐ Other:__________________

Piping Leak Detection

- ☐ None
- ☐ Interstitial Electronic Monitoring
- ☐ Vapor Well
- ☐ Groundwater Well
- ☐ Pressurized Piping Leak Detector
- ☐ Exempt Suction Piping
- ☐ Statistical Inventory Reconciliation (SIR)
- ☐ Other:__________________

ATTACHMENT B:
NYSDEC PBS APPLICATION

New York State Department of Environmental Conservation
Division of Environmental Remediation

PBS Number:

Petroleum Bulk Storage Application

Pursuant to the Environmental Conservation Law: Article 17, Title 10; and
Regulations 6 NYCRR Part 613 and 6 NYCRR Subpart 374-2
(Please Type or Print Clearly and Complete All Items for Sections A, B & C)

Return Completed Form & Fees To:

Expiration Date:

Section A - Facility/Property Owner/Contact Information

Transaction Type:

1) Initial/New Facility
2) Change of Ownership
3) Tank Installation, Closing, or Repair
4) Information Correction
5) Renewal

FACILITY

Facility Name:			Tax Map Info: Borough/Section:
Facility Address (Physical Address, No P.O. Boxes)			Block:
Facility Address (cont.):			Lot:
City:		State:	ZIP Code:
County:	Township/City		Facility Phone Number:
Name of Class B (Daily On-Site) Operator:			Operator Authorization No.
Name of Class A (Primary) Operator:			Operator Authorization No.

TYPE OF PETROLEUM FACILITY (Check only one)

- ☐ 01=Storage Terminal/Petrol. Distributor
- ☐ 02=Retail Gasoline Sales
- ☐ 03=Other Retail Sales
- ☐ 04=Manufacturing
- ☐ 05=Utility
- ☐ 06=Trucking/Transportation/Fleet
- ☐ 07=Apartment/Office Building
- ☐ 08=School
- ☐ 09=Farm
- ☐ 10=Private Residence
- ☐ 11=Airline/Air Taxi/Airport
- ☐ 12=Chemical Distributor
- ☐ 13=Municipality
- ☐ 15=Railroad
- ☐ 25=Auto Service/Repair (No Gasoline Sales)
- ☐ 16=Nuclear Power Plant
- ☐ 26=Religious (Church, Synagogue, Mosque, Temple, etc.)
- ☐ 27=Hospital/Nursing Home/Health Care
- ☐ 28=Cemetery / Memorial
- ☐ 52=Marina
- ☐ 99=Other (Specify): ____________________

NOTE:

Fill in Property Owner information here……>>>

Indicate Tank Owner in Section C.

OWNER

Facility (Property) Owner (from Deed):		
Facility Owner Address (Street and/or P.O. Box):		
City:	State:	ZIP Code:
Federal Tax ID Number:	Owner Telephone Number:	

Type of Owner: (check only one)

1 ☐ Private Resident
2 ☐ State Government
3 ☐ Local Government
4 ☐ Federal Government
5 ☐ Corporate/Commercial/Other

Emergency Contact Name:	Emergency Telephone Number:

I hereby certify, under penalty of law, that all of the information provided on this form is true and correct. False statements made herein may be punishable as a criminal offense and/or a civil violation in accordance with applicable state and federal law.

Name of Property Owner or Authorized Representative:	Amount Enclosed: $
Title:	
Signature:	Date:

Official Use Only
Date Received: ____/____/____
Date Processed: ____/____/____
Amount Received: $____________
Reviewed By: ____________
Rev. 10/03/15

CORRESPONDENCE

(Please keep this information up to date Facility Contact Person Name:	
Contact Person Company Name:	
Address:	
Address (cont.):	
City/State/ZIP Code:	
Tel. Number:	eMail Address:

For Overdue Registrations Only:

If you are submitting an application for an overdue registration, you may settle the violation by submitting the normal fee, any back fees due, and a penalty of $50 for every month the application is overdue. If you decline to settle, or make no choice, the case will be referred for enforcement which may result in higher penalties to resolve the violations. Please indicate your choice below:

- ☐ I agree to settle and have enclosed the proper fees and penalty amounts.
- ☐ I decline to settle and understand that higher penalties may result.

PBS Number:

Section B - Tank Information

(Please use the key located on the last page to complete each item/column)

Registration Expiration Date:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Action	Tank Number	Tank Location	Status	Installation, Out of service or Permanent Closure Date (MM/DD/YYYY) **Application will be returned if blank**	Capacity (Gallons)	Product Stored (If Gasoline w/ethanol or Biodiesel, list %additive) %	Tank Type	Tank Internal Protection	Tank External Protection	Tank Secondary Containment	Tank Leak Detection	Tank Overfill Prevention	Tank Spill Prevention	Pumping/Dispensing Method	Piping Location	Piping Type	Piping External Protection	Piping Secondary Containment	Piping Leak Detection	Under Dispenser Containment (UDC) (Check box if present)
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Note: If you need to add tanks to your registration, write them in using blank lines above. Attach additional sheets as needed.
Blank Section B is available at http://www.dec.ny.gov/docs/remediation_hudson_pdf/pbsrenewal.pdf

PBS Number:

Petroleum Bulk Storage Application

Section C – Tank Ownership Information (for PBS tanks listed in Section B)

Tank Owner Information ☐ Check box if same as Facility (Property) Owner. If tank owner is different from property owner, fill out information below:			Tank Owner Information			Tank Owner Information		
Tank Owner Name (Company/Individual):			Tank Owner Name (Company/Individual):			Tank Owner Name (Company/Individual):		
Contact Person:			Contact Person:			Contact Person:		
Tank Owner Address:			Tank Owner Address:			Tank Owner Address:		
Tank Owner Address (cont.)			Tank Owner Address (cont.)			Tank Owner Address (cont.)		
City:	State:	ZIP:	City:	State:	ZIP:	City:	State:	ZIP:
Contact Person Telephone Number:			Contact Person Telephone Number:			Contact Person Telephone Number:		
Contact Person Email:			Contact Person Email:			Contact Person Email:		

Specific Tanks Owned ☐ Check box if this owner owns all tanks at this facility. If not, list tanks owned by this owner below:		Specific Tanks Owned		Specific Tanks Owned	
Tank Number	Tank Number (cont.)	Tank Number	Tank Number (cont.)	Tank Number	Tank Number (cont.)

Attach additional sheets as needed.

PETROLEUM BULK STORAGE APPLICATION – SECTION B – TANK INFORMATION – CODE KEYS

Action (1)
1. Initial Listing
2. Add Tank
3. Close/Remove Tank
4. Information Correction
5. Repair/Reline Tank

Tank Location (3)
1. Aboveground-contact w/ soil
2. Aboveground-contact w/ impervious barrier
3. Aboveground on saddles, legs, stilts, rack or cradle
4. Tank with 10% or more below ground
5. Underground including vaulted with no access for inspection
6. Aboveground in Subterranean Vault w/ access for inspections

Status (4)
1. In-service
2. Out-of-service
3. Closed-Removed
4. Closed-In Place
5. Tank converted to Non-Regulated use

D. Delivery Prohibited

Products Stored (7)

Heating Oils: On-Site Consumption
0001. #2 Fuel Oil
0002. #4 Fuel Oil
0259. #5 Fuel Oil
0003. #6 Fuel Oil
0012. Kerosene
0591. Clarified Oil
2711. Biodiesel (Heating)
2642. Used Oil (Heating)

Heating Oils: Resale/ Redistribution
2718. #2 Fuel Oil
2719. #4 Fuel Oil
2720. #5 Fuel Oil
2721. #6 Fuel Oil
2722. Kerosene
2723. Clarified Oil
2724. Biodiesel (Heating)

Motor Fuels
0009. Gasoline
2712. Gasoline/Ethanol
0008. Diesel
2710. Biodiesel
0011. Jet Fuel
1044. Jet Fuel (Biofuel)
2641. Aviation Gasoline

Lubricating/Cutting Oils
0013. Lube Oil
0015. Motor Oil
1045. Gear/Spindle Oil
0010. Hydraulic Oil
0007. Cutting Oil
0021. Transmission Fluid
1836. Turbine Oil
0308. Petroleum Grease

Oils Used as Building Materials
2626. Asphaltic Emulsions
0748. Form Oil

Petroleum Spirits
0014. White/Mineral Spirits
1731. Naphtha

Mineral/Insulating Oils
0020. Insulating Oil (e.g., Transformer, Cable Oil)
2630. Mineral Oil

Waste/Used/Other Oils
0022. Waste/Used Oil
9999. Other-Please list:*

Crude Oil
0006. Crude Oil
0701. Crude Oil Fractions

Tank Type (8)
01. Steel/Carbon Steel/Iron
02. Galvanized Steel Alloy
03. Stainless Steel Alloy
04. Fiberglass Coated Steel
05. Steel Tank in Concrete
06. Fiberglass Reinforced Plastic (FRP)
07. Plastic
08. Equivalent Technology
09. Concrete
10. Urethane Clad Steel
99. Other-Please list:*

Internal Protection (9)
00. None
01. Epoxy Liner
02. Rubber Liner
03. Fiberglass Liner (FRP)
04. Glass Liner
99. Other-Please list:*

External Protection (10/18)
00. None
01. Painted/Asphalt Coating
02. Original Sacrificial Anode
03. Original Impressed Current
04. Fiberglass
05. Jacketed
06. Wrapped (Piping)
07. Retrofitted Sacrificial Anode
08. Retrofitted Impressed Current
09. Urethane
99. Other-Please list:*

Tank Secondary Containment (11)
00. None
01. Diking (AST Only)
02. Vault (w/access)
03. Vault (w/o access)
04. Double-Walled (UST Only)
05. Synthetic Liner
06. Remote Impounding Area
07. Excavation Liner
09. Modified Double-Walled (AST Only)
10. Impervious Underlayment (AST only)**
11. Double Bottom (AST Only)**
12. Double-Walled (AST Only)
99. Other-Please list*

Tank Leak Detection (12)
00. None
01. Interstitial Electronic Monitoring
02. Interstitial Manual Monitoring
03. Vapor Well
04. Groundwater Well
05. In-Tank System (Auto Tank Gauge)
06. Impervious Barrier/Concrete Pad (AST Only)
07. Statistical Inventory Reconciliation (SIR)
08. Weep holes in vaults with no access for inspection
99. Other-Please list:*

Overfill Protection (13)
00. None
01. Float Vent Valve
02. High Level Alarm
03. Automatic Shut-Off
04. Product Level Gauge (AST Only)
05. Vent Whistle
99. Other-Please list:*

Spill Prevention (14)
00. None
01. Catch Basin
99. Other-Please list:*

Pumping/Dispensing Method (15)
00. None
01. Pressurized Dispenser
02. Suction Dispenser
03. Gravity
04. On-Site Heating System (Suction)
05. On-Site Heating System (Supply/Return)
06. Tank-Mounted Dispenser
07. Loading Rack/Transfer Pump

Piping Location (16)
00. No Piping
01. Aboveground
02. Underground/On-ground
03. Aboveground/Underground Combination

Piping Type (17)
00. None
01. Steel/Carbon Steel/Iron
02. Galvanized Steel
03. Stainless Steel Alloy
04. Fiberglass Coated Steel
05. Steel Encased in Concrete
06. Fiberglass Reinforced Plastic (FRP)
07. Plastic
08. Equivalent Technology
09. Concrete
10. Copper
11. Flexible Piping
99. Other-Please list:*

Piping Secondary Containment (19)
00. None
01. Diking (Aboveground Only)
02. Vault (w/access)
04. Double-Walled (Underground Only)
06. Remote Impounding Area
07. Trench Liner
12. Double-Walled (Aboveground Only)
99. Other-Please list:*

Pipe Leak Detection (20)
00. None
01. Interstitial Electronic Monitoring
02. Interstitial Manual Monitoring
03. Vapor Well
04. Groundwater Well
07. Pressurized Piping Leak Detector
09. Exempt Suction Piping
10. Statistical Inventory Reconciliation (SIR)
99. Other-Please list:*

Under Dispenser Containment (UDC) (21)
Check Box if Present

----

* If other, please list on a separate sheet including tank number.

** Each of these codes must be combined with code 01 or 06 to meet compliance requirements.

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

SOIL REMOVAL

SOP#: H-RA-02

OCTOBER 2018

Prepared By:

Name: Ashutosh Sharma Signature: ____________ Date: 10-31-18

Prepared By:

Name: Stephen Malinowski Signature: ____________ Date: 10-31-18

Approved By:

Name: Marc Godick Signature: ____________ Date: 10-31-18

Approved By:

Name: Marcus Simons Signature: ____________ Date: 10-31-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Field Professionals on how to properly plan, coordinate, execute, and document the excavation and removal of project site soil/fill material. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

This SOP can be applied to various projects where AKRF is providing consulting services relating to soil/fill excavation and removal, including but not limited to redevelopment sites and underground storage tank removal projects.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during soil removal, as appropriate:

SOP #H-RA-01	Storage Tank Removal/Closure
SOP #H-RA-03	Environmental Air Monitoring
SOP #H-FW-01	Documentation
SOP #H-SI-02	Soil Classification and Logging
SOP #H-SI-03	Soil Boring Oversight and Sampling
SOP #H-SI-04	Test Pit Oversight and Sampling

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- ☐ OSHA Level D PPE
- ☐ Nitrile Gloves
- ☐ Measuring Wheel or Tape Measure
- ☐ Photoionization Detector (PID) & Calibration Kit (confirm with PM)
- ☐ Particulate Dust Meter & Calibration Kit (confirm with PM)
- ☐ Digital Camera or Device with Digital Camera with Time/Date Stamp
- ☐ Sampling Jars/Collection Equipment for Contingent Soil or Groundwater Sampling
- ☐ Permanent Marker and Field Book
- ☐ Spray Paint/Marking Flags
- ☐ AKRF Employee ID
- ☐ Clipboard and Pens

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-specific HASP
- AKRF Site-specific Scope of Work [e.g., Excavation Work Plan, Remedial Action Work Plan (RAWP), etc.]
- Excavated Material Disposal Plan (EMDP), Site Disposal Grid Plan, or Maps/Drawings showing the grid locations for soil disposal and the approved disposal facilities (See Attachment A for a Figure Example)
- AKRF Truck Tracking Logs (see Attachment B for the Truck Tracking Log Template and a finished example), to be completed during implementation of this SOP
- Soil Waste Characterization Report(s) and Other Subsurface Investigation Reports (as applicable)
- Client Authorization for Signing the Disposal Manifests (see Attachment C for example soil manifests)
- Blank AKRF Air Monitoring Logs, if applicable
- Related SOPs listed in Section 3.0

6.0 SITE PREPARATION

Prior to excavation and soil export, mark out the site with the locations of the disposal grids identified in the project's waste classification reports, disposal facility approval letters, or in an EDMP. Discuss the anticipated scope of work with the excavation contractor and confirm that:

- The correct manifests have been provided (make sure to check all information);
- The contractor will provide a water mist for dust control, as well as other odor control requirements defined in the work plan/scope of work (e.g. tarps, odor controlling foam, masking agents, etc.);
- Personnel are available to inspect and clean each truck's wheels and undercarriage, prior to it exiting the site, using brooms, hoses, and/or pressure washers (this is done ensure that soil is not tracked off-site and onto the roadway). For many sites, a gravel pad is required under the RAWP;
- The contractor has poly-sheeting for stockpiling/staging any soil not being direct loaded into trucks; and
- The required air monitoring equipment, if any, is working and has been calibrated prior to use (refer to SOP #H-RA-03).

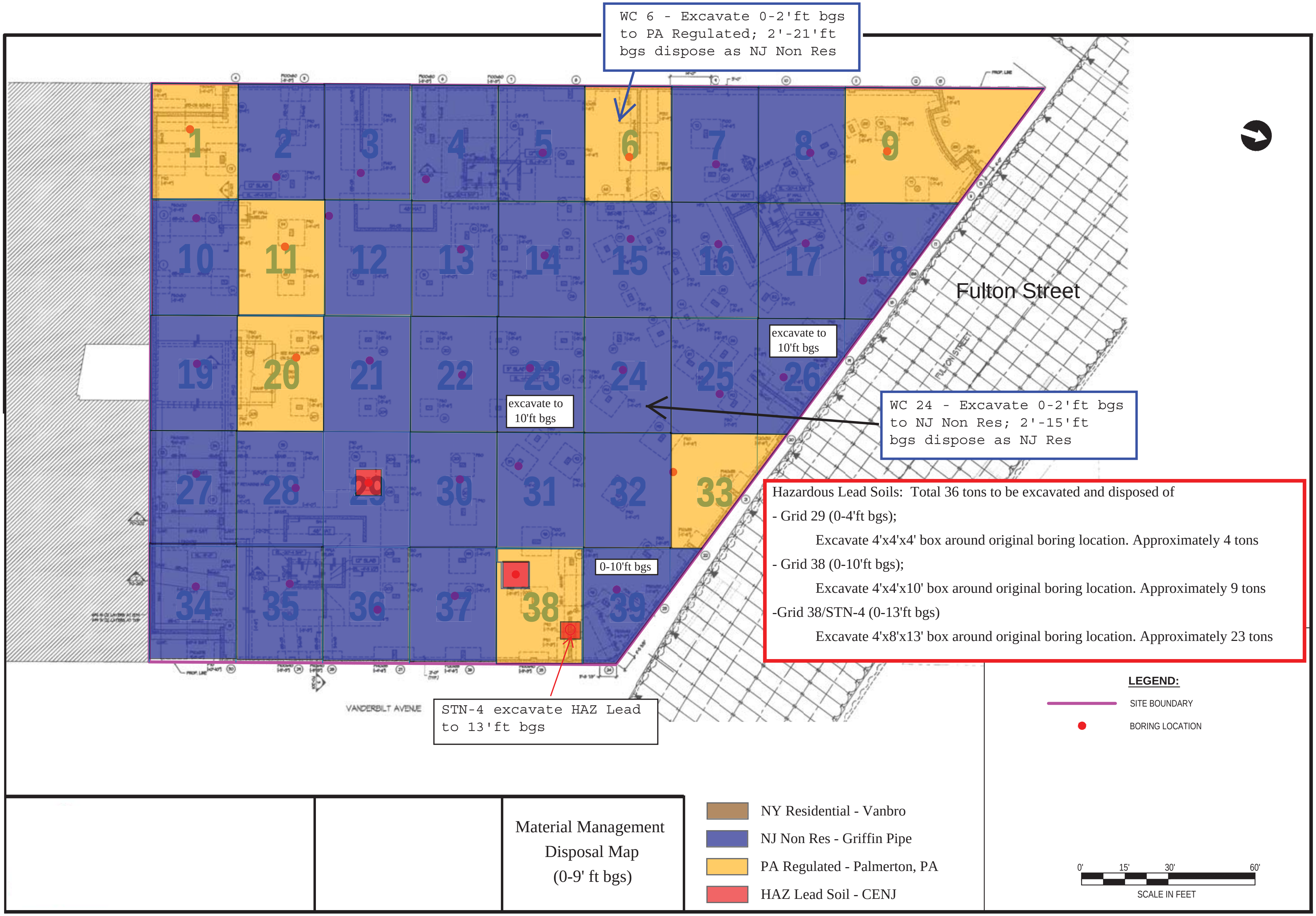
7.0 SOIL EXCAVATION AND REMOVAL PROCEDURES

The AKRF Field Professional is responsible for the following:

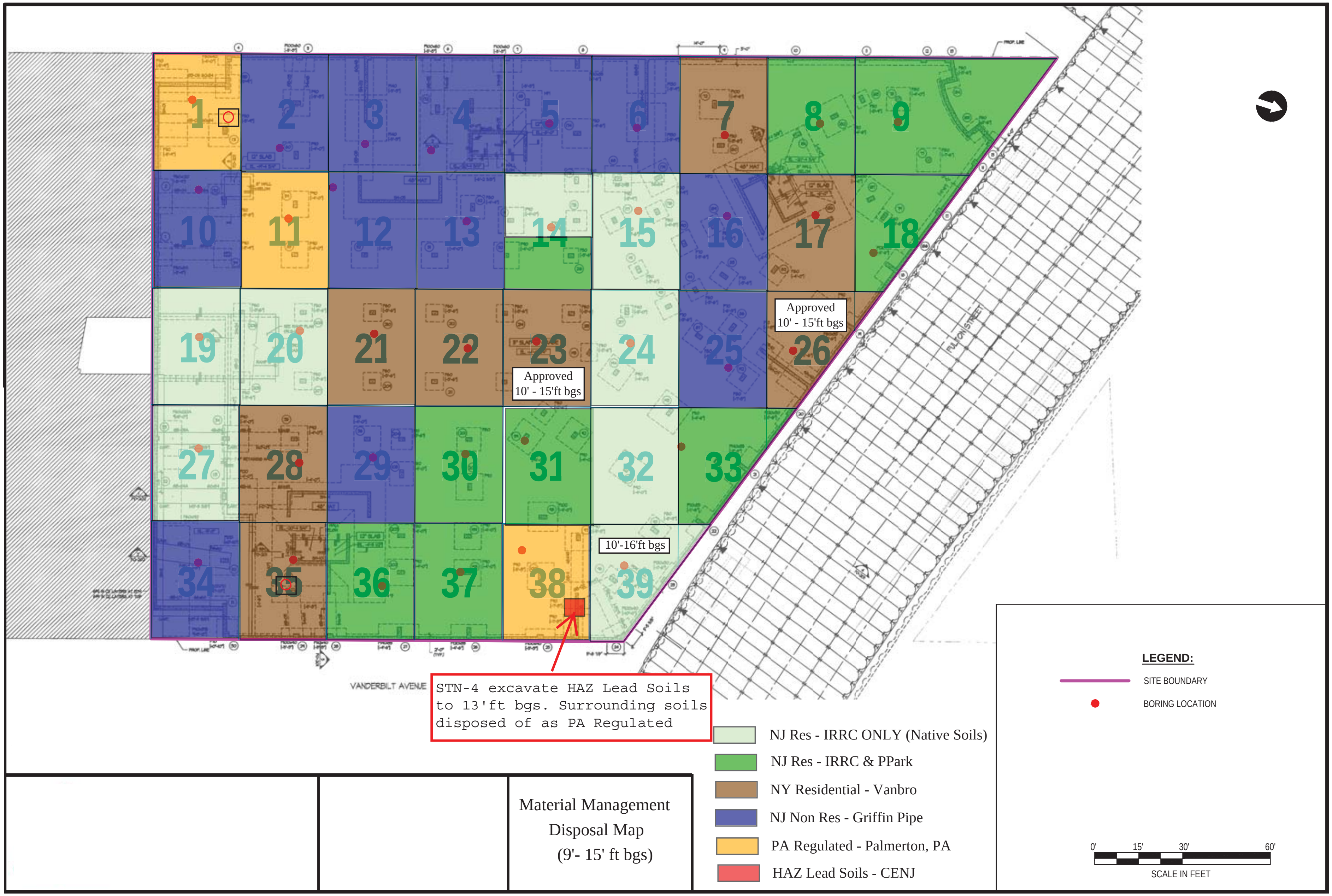
- Documenting the daily excavation and soil/material trucking in the field book (see SOP #H-FW-01);
- Marking out the extent (e.g., grids) of soil designated for excavation and export in accordance with disposal facility requirements (Attachment A shows an example of soil disposal grids);
- Conducting air monitoring, per SOP #H-RA-03;
- Screening excavated soil with a PID and looking for other contamination (staining, sludge, odors, etc.) to ensure the soil does not violate facility requirements;

- Ensuring that the soil/material is excavated and loaded onto the trucks based on the disposal facility approval letters (soils from various grids/different site locations designated for the same disposal facility can be comingled for export);
- Confirming the EPA Site ID number, the site and owner information, and the waste management code on the soil disposal manifests prior to excavation and trucking of waste (see Attachment C for sample soil manifests);
- Confirming with the contractor that the machine operator and the laborers involved with disposal of material have 40-hour HAZWOPER certifications and up-to-date 8-hour refresher training;
- Logging the soil in the field book per SOP #H-SI-02, if required by the work plan;
- Ensuring that the truck driver signs the manifest under the transporter section. The AKRF Field Personnel shall sign manifests only "As Agent" for the Generator (Client) and keep a copy of the signed manifest on-site.
- Maintaining truck logs (see Attachment B) for all soil/material leaving the site. The logs should include the truck company, truck information, and disposal site information (location and type of facility, as well as name and address);
- Ensuring that soil adhering to truck tires is not being tracked off-site and that all dust control measures are being implemented;
- Taking photographs before, during, and after excavation;
- Ensuring any excess excavated soil is stockpiled appropriately at the end of the workday. The material should be stockpiled on, and covered with, poly sheeting;
- Discussing the next day's excavation/disposal plans with the contractor prior to leaving the site, and ensuring that all required paperwork (including manifests and approval letters) will be available;
- Preparing the daily report if required by the RAWP or Client; and
- Bringing all paperwork back to the office for uploading to the project folder, per SOP #H-FW-01.

ATTACHMENT A:
EXAMPLE FIGURE



WC 6 - Excavate 0-2'ft bgs to PA Regulated; 2'-21'ft bgs dispose as NJ Non Res
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Fulton Street
19
20
21
22
23
24
25
26
excavate to 10'ft bgs
excavate to 10'ft bgs
WC 24 - Excavate 0-2'ft bgs to NJ Non Res; 2'-15'ft bgs dispose as NJ Res
27
28
29
30
31
32
33
Hazardous Lead Soils: Total 36 tons to be excavated and disposed of
- Grid 29 (0-4'ft bgs);
Excavate 4'x4'x4' box around original boring location. Approximately 4 tons
- Grid 38 (0-10'ft bgs);
Excavate 4'x4'x10' box around original boring location. Approximately 9 tons
-Grid 38/STN-4 (0-13'ft bgs)
Excavate 4'x8'x13' box around original boring location. Approximately 23 tons
34
35
36
37
38
39
0-10'ft bgs
VANDERBILT AVENUE
STN-4 excavate HAZ Lead to 13'ft bgs
LEGEND:
SITE BOUNDARY
BORING LOCATION
Material Management Disposal Map (0-9' ft bgs)
NY Residential - Vanbro
NJ Non Res - Griffin Pipe
PA Regulated - Palmerton, PA
HAZ Lead Soil - CENJ
0' 15' 30' 60'
SCALE IN FEET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32
33
34
35
36
37
38
39
Approved
10' - 15'ft bgs
Approved
10' - 15'ft bgs
10'-16'ft bgs
STN-4 excavate HAZ Lead Soils
to 13'ft bgs. Surrounding soils
disposed of as PA Regulated
VANDERBILT AVENUE
FULTON STREET
NJ Res - IRRC ONLY (Native Soils)
NJ Res - IRRC & PPark
NY Residential - Vanbro
NJ Non Res - Griffin Pipe
PA Regulated - Palmerton, PA
HAZ Lead Soils - CENJ
LEGEND:
SITE BOUNDARY
BORING LOCATION
0'
15'
30'
60'
SCALE IN FEET
Material Management
Disposal Map
(9'- 15' ft bgs)

LEGEND:

SITE BOUNDARY

BORING LOCATION

NJ Res - IRRC ONLY (Native Soils)

NJ Res - IRRC & PPark

NJ Non Res - Griffin Pipe

PA Regulated - Palmerton, PA

No Soils to be Excavated

0' 15' 30' 60'

SCALE IN FEET

Material Management Disposal Map (15' - 20' ft bgs)


21'-24' ft bgs
21'-24'ft bgs
20'-21'ft bgs
20'-24' ft bgs
20'-24'ft bgs
20'-24'ft bgs
20'-24'ft bgs
20'-24'ft bgs
20'-24'ft bgs
VANDERBILT AVENUE
FULTON STREET
LEGEND:
SITE BOUNDARY
BORING LOCATION
NJ Res Soils - IRRC ONLY (Native Soils)
NJ Res Soils - IRRC & PPark
NJ Non Res - Griffin Pipe
PA Regulated - Palmerton, PA
No Soils to be Excavated
0'
15'
30'
60'
SCALE IN FEET
Material Management
Disposal Map
(20'-27' ft bgs)

ATTACHMENT B:
EXAMPLE & TRUCK TRACKING LOG TEMPLATE

AKRF

Outgoing Truck Tracking Log

AKRF Project No:	#11713	**Client:**	Phipps
Project Location:	988 E 180th St	**Logged By:**	T Simmons
Date:	9/22/17	**Weather:**	66°F sunny

Daily Truck Number	Time In	Truck Company	License Plate	Destination Facility	Material & Origin	Manifest Number	Time Out
1	7:00	Shirley Express/14	AP752U	PPark	SP-1 (0-6')	1588134	7:06
2	7:10	logitech /03	AS369X	"	"	1588133	7:13
3	8:38	Shirley Express/06	AS125L	"	"	1588132	8:47
4	8:48	Shirley Express/14	AP752U	"	"	1588131	8:52
5	9:36	XPress/68	AT9985Z	"	"	1588130	9:42
6	9:43	Shirley Express/36	AS261B	"	"	1588129	9:47
7	9:48	Shirley Express/34	AS836B	"	"	1588128	9:51
8	9:52	Shirley Express/40	AS838B	"	TP-1 (0-10')	1588127	9:56
9	9:57	Shirley Express/50	AS315X	"	"	1588126	10:01
10	10:02	Shirley Express/02	AP161M	"	"	1588125	10:07

Notes:

Page no. 1 of 1

AKRF

Outgoing Truck Tracking Log

AKRF Project No:		**Client:**	
Project Location:		**Logged By:**	
Date:		**Weather:**	

Daily Truck Number	Time In	Truck Company	License Plate	Destination Facility	Material & Origin	Manifest Number	Time Out
Notes:						Page no. of	

Attachment C:
Example Soil Manifests

CLEANEARTH

Manifest # 1312047

GLOBAL JOB NUMBER: 137902/153030059 **FACILITY APPROVAL NUMBER:** OPL013

Please Check One:

- ☐ Clean Earth of Carteret, 24 Middlesex Avenue, Carteret, NJ 07008, Ph: 732-541-8909
- ☐ Clean Earth of Maryland, 1469 Oak Ridge Place, Hagerstown, MD 21740, Ph: 301-791-6220
- ☐ Clean Earth of New Castle, 94 Pyles Lane, New Castle, DE 19720, Ph: 302-427-6633
- ☐ Clean Earth of Greater Washington, 6250 Dower House Road, Upper Marlboro, MD 20772, Ph: 301-599-0939
- ☐ Clean Earth of Philadelphia, 3201 S. 61st Street, Philadelphia, PA 19153, Ph: 215-724-5520
- ☐ Clean Earth of North Jersey, 115 Jacobus Avenue, Kearny, NJ 07032, Ph: 973-344-4004
- ☐ Clean Earth of Southeast Pennsylvania, 7 Steel Road East, Morrisville, PA 19067, Ph: 215-428-1700
- ☑ Other Overpeck Park LF, 40-40 Fort Lee Road, Leonia NJ

Non-Hazardous Material Manifest

(Type or Print Clearly)

GENERATOR'S NAME & SITE ADDRESS: Site #1 DSA Owner LLC/Essex Crossing Site #1 236 Broome Street New York, NY 10013	GROSS WEIGHT: ☐Tons ☐Yards	98520 lb GROSS 28620 lb PT TARE
	TARE WEIGHT: ☐Tons ☐Yards	59900 lb NET AM 03/08/2016
GENERATOR'S PHONE: 212-220-9945	NET WEIGHT: ☐Tons ☐Yards	

DESCRIPTION OF MATERIAL/SAMPLE ID AND LOCATION

Non Hazardous Material B1/B2(10-22)

GENERATOR'S CERTIFICATION – Incomplete and/or unsigned manifests will cause the load to be delayed and/or rejected.

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, is not a DOT hazardous substance as defined by 49 CFR Part 172 or any applicable state law, has been fully and accurately described above, classified, packaged and is in proper condition for transportation according to all applicable state and federal regulations.

Name: MARCO BALLETTA Title: As agent for Generator

Signature: [signature] Date and Time: 03/08/16 7:30 AM

TRANSPORTER

Company: MANDOS TRUCKING #02 Phone Number: 908-820-4015

Address: 58 Moore Rd Belleville NJ Truck # and License Plate: AK597T #02

Driver: Cristian Dlovo SW Haulers Permit #:

(Type or Print Clearly) (applicable state permit #)

I hereby certify that the above named material was picked up at the site listed above.

Driver Signature: [signature] Date and Time: 3-08-16

DESTINATION

I hereby certify that the above named material was delivered without incident to the facility noted above.

Driver Signature: [signature] Date and Time: 3-08-16

I hereby certify that the above named material has been accepted at the above referenced facility.

Authorized Signature: Henry Esnake Date and Time: 3/8/16

FACILITY

1/29/3/1

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number NYR000228643	2. Page 1 of 1	3. Emergency Response Phone Rapid Response Inc. 877-460-1038	4. Manifest Tracking Number 017043474 JJK

5. Generator's Name and Mailing Address

RXR 810 Fulton Owner LLC
c/o RXR Realty, 625 RXR Plaza,
Uniondale NY 11556

Generator's Phone: 516-874-2960

Generator's Site Address (if different than mailing address)

810 Fulton St.
Brooklyn NY 11249

6. Transporter 1 Company Name: J & D Trucking Inc. — U.S. EPA ID Number: NJR000029967

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address

Clean Earth of North Jersey
105 Jacobus Ave.
Kearny, NJ 07032

Facility's Phone: 973-344-4004

U.S. EPA ID Number: NJD991291105

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. RQ, NA3077, Hazardous Waste Solid, n.o.s. (Lead Soil), 9,,PG III	001	DT	EST 48,000	P	~~D008~~ D008
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

1. S/E ERG #171 # WX 8

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: David Lewis As Agent for Gonzalez — Signature: [signature] — Month 4 Day 7 Year 17

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Calvin Manley — Signature: Cal Manley — Month 4 Day 7 Year 17

Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

No. 1 4? 30 LBS

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

RECEIVED PENDING MANIFES
REVIEW AND QUALITY CONT OL

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H110			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Bernice Mills — Signature: Bernice Mills — Month 4 Day 11 Year 17

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

TRANSPORTER'S COPY

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

ENVIRONMENTAL AIR MONITORING

SOP#: H-RA-03

OCTOBER 2018

Prepared By:

Name: Ashutosh Sharma Signature: ______________ Date: 10-31-18

Prepared By:

Name: Stephen Malinowski Signature: ______________ Date: 10-31-18

Approved By:

Name: Michelle Lapin Signature: ______________ Date: 10-31-18

Approved By:

Name: Marcus Simons Signature: ______________ Date: 10-31-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Field Professionals on how to properly plan, coordinate, execute, and document the environmental air monitoring requirements at a project site. These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

This SOP can be applied to various projects where AKRF is hired to provide environmental air monitoring services (community and/or work zone), typically during soil/fill excavation and removal. This includes, but is not limited to, redevelopment and demolition activities (e.g. excavation) associated with remedial sites and underground storage tank removals. However, this SOP does not address air monitoring for asbestos abatement or lead paint abatement projects. Please refer to SOP #H-AS-02 for asbestos air monitoring.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Construction Health and Safety Plan (CHASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during environmental air monitoring, as appropriate:

SOP #H-RA-01	Storage Tank Removal/Closure
SOP #H-RA-02	Soil Removal
SOP #H-FW-01	Documentation
SOP #H-FW-02	Safety for Non-Intrusive Investigations

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- ☐ OSHA Level D PPE
- ☐ Nitrile Gloves
- ☐ Measuring Wheel or Tape Measure
- ☐ Photoionization Detector(s) (PID) & Calibration Kit
- ☐ Particulate Dust Meter(s) & Calibration Kit
- ☐ Equipment Enclosure(s) and Netronix, or equivalent Remote Monitoring set-up, if applicable
- ☐ Digital Camera or Device with Digital Camera
- ☐ Permanent Marker and Field Book
- ☐ Smartphone with Remote Monitoring Software Applications
- ☐ Other:______________________________

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-Specific CHASP
- AKRF Site-Specific Scope of Work [e.g., Phase II Work Plan, Remedial Investigation (RI) Work Plan, Remedial Action Work Plan (RAWP), or Proposal]
- AKRF Air Monitoring Logs (see Attachment A for the Air Monitoring Log Template and a finished example), to be completed during implementation of this SOP
- Phone Number and Contact Information for Equipment Vender
- Related SOPs listed in Section 3.0

6.0 ON-SITE PREPARATION

Prior to setting up any stationary air monitoring station, discuss planned locations (upwind and/or downwind) and the planned scope/duration of monitoring with the Contractor's site supervisor to ensure that the locations are away from construction equipment and staging areas. Check that there is a field office/trailer or electrical outlet available for powering/charging the equipment overnight.

7.0 AIR MONITORING PROCEDURES

The AKRF Field Professional is responsible for the following:

- Calibrating all equipment per the manufacturers' specifications;
- Ensuring that the equipment is set up to collect and record 15-minute average readings (or the frequency required by the CHASP);
- Understanding the response levels and required corrective actions (if a need arises to use Level C PPE in the work zone, immediately contact your Project Manager, notify the site supervisor, and stop work in the area where exceedances were noted);
- Establishing background levels of dust and VOCs;
- Ensuring that all equipment is charged properly to last the full work day;
- Checking stationary monitoring equipment at least once per hour to ensure all are working;
- Maintaining an air monitoring log with readings taken at the frequency required by the work plan or, at a minimum, once per half-hour during work (see Attachment A);
- Notifying the Project Manager and the site supervisor if exceedances are noted, as well as investigating the possible reasons for the exceedance and initiating corrective action. Note the exceedances and the corrective actions taken on the air monitoring log. Also discuss them in the daily report;
- Marking the monitoring locations (for stationary setup) on a site plan for project records;
- Collecting the equipment at the end of the work day, downloading the data, and charging and securing the equipment before leaving the site;
- Taking photos throughout the day for proper documentation; and
- Bringing all paperwork back to the office for uploading to the project folder, per SOP #H-FW-01.

ATTACHMENT A:
EXAMPLE & AIR MONITORING LOG TEMPLATE

AKRF, Inc.

Air Monitoring Log

Project:		Client:	Date:
Work Activity:			Logged By:
			Job No:
Weather:	Wind Direction:		Wind Speed:

TIME	LOCATION	PID (ppm)	DUST (mg/m^3)	ODORS	COMMENTS (activity; work zone, upwind or downwind)
					BACKGROUND

Work Zone Action Levels	
PID	**DUST**
<5 ppm: Level D	<0.150 mg/m^3 above background in breathing zone: level D
Between 5 ppm and 50 ppm: level C	
>50 ppm: STOP	>0.150 mg/m^3 above background in breathing zone: Dust suppression

Community (Perimeter) Action Levels	
PID	**DUST**
>5 ppm above background: vapor suppression	>0.1 mg/m^3 above background: dust suppression
>25 ppm above background: STOP	**>0.15 mg/m^3 above background: STOP**

AKRF, Inc.
Environmental Consultants

Air Monitoring Log

Project: 810 Fulton Street	Client: RXR	Date: 4/7/2017	
Work Activity: Excavation/Disposal (2,27,28,29)/(1,11,20,29,38)/(2,10,36); SOE (34/35)		Logged By: D. Lewis	Job No: 12549
Weather: Cloudy 40's-50's °F	Wind Direction: W	Wind Speed: 11	

TIME	LOCATION	PID (ppm)	DUST (mg/m^3)	ODORS	COMMENTS (activity; work zone, upwind or downwind)
700	Claremont Ave	0.1	0.013	ND	BACKGROUND - Perimeter
730	WC-10	ND	0.029	ND	Excavation
800	↓	0.1	0.036	ND	↓
830		ND	0.031	ND	
900	↓	ND	0.033	ND	↓
930	WC-10	ND	0.035	ND	Excavation
1000	↓	ND	0.036	ND	↓
1030	WC-35	ND	0.031	ND	SOE
1100	↓	ND	0.033	ND	↓
1130	WC-34	ND	0.038	ND	Excavation
1200	Vanderbilt Ave.	ND	0.026	ND	Perimeter
1230	WC-11	ND	0.034	ND	Excavation
1300	↓	ND	0.037	ND	↓
1330	↓	ND	0.040	ND	↓
1400	WC-11	ND	0.041	ND	Excavation
1430	WC-35	ND	0.035	ND	SOE
1500	↓	ND	0.039	ND	↓
1530		ND	0.031	ND	
1600	↓	ND	0.035	ND	↓
1630	WC-11	ND	0.039	ND	Excavation
1700	↓	ND	0.036	ND	↓
1730	↓	ND	0.038	ND	↓

Work Zone Action Levels	
OVM	DUST
<10 ppm: level D	<5 mg/m^3: level D
>10 ppm: level C	>2.5 mg/m^3: dust suppression
>20 ppm: STOP	>5 mg/m^3: level C
	>125mg/m^3: STOP

Community (Perimeter) Action Levels	
OVM	DUST
>5 ppm above background: vapor suppression	>0.1 mg/m^3 above background: dust suppression
>25 ppm above background: STOP	**>0.15 mg/m^3 above background: STOP**

END OF SOP

STANDARD OPERATING PROCEDURE FOR:

GAUGING AND COLLECTION OF NON-AQUEOUS PHASE LIQUID

SOP#: H-RA-04

OCTOBER 2018

Prepared By:

Name: Kenneth Wiles Signature: __________ Date: 10-31-18

Prepared By:

Name: Bryan Zieroff Signature: __________ Date: 10-31-18

Approved By:

Name: Michelle Lapin Signature: __________ Date: 10-31-18

Approved By:

Name: Marcus Simons Signature: __________ Date: 10-31-18

AKRF, Inc.
Hazardous Materials Department for Site Assessment & Remediation

TABLE OF CONTENTS

1.0 OBJECTIVE

This standard operating procedure (SOP) instructs AKRF Field Professionals on how to gauge monitoring wells for the presence or absence of non-aqueous phase liquid (NAPL), measure the depth to NAPL and groundwater, and collect NAPL samples (if necessary). These instructions are generally applicable, but may need to be adjusted depending on site conditions, equipment limitations, or other factors. In all instances, the procedures ultimately employed should be documented for accurate reporting.

2.0 SCOPE AND APPLICATION

This SOP is to determine an accurate depth to groundwater and NAPL (if present) and provide procedures for sampling NAPL.

Obtaining consistent and accurate well gauging data is critical. Well gauging data can provide a long-term record of: seasonal groundwater fluctuations; the presence, location, and thickness of NAPL; and the effectiveness of recovery well operations.

All activities should be conducted in conformance with AKRF's company-wide and/or site-specific Health and Safety Plan (HASP).

Prior to visiting the site and using this SOP, the AKRF Field Professional must confirm the applicability of this SOP with their Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

The following SOPs should also be used and/or cross-referenced during the gauging and collection of NAPL, as appropriate:

SOP #H-FW-01	Documentation
SOP #H-FW-02	Safety for Non-Intrusive Investigations
SOP #H-SI-12	Decontamination
SOP #H-SI-13	Investigation Derived Waste

4.0 EQUIPMENT LIST

The following personal protective equipment (PPE) and monitoring equipment is required, at a minimum, for the AKRF Field Professional using this SOP:

- ☐ OSHA Level D PPE
- ☐ Nitrile Gloves
- ☐ Oil-Water Interface Meter & Decontamination Supplies
- ☐ Photoionization Detector (PID) & Calibration Kit
- ☐ Bailers and Bailer String/Rope (each monitoring well with suspect NAPL should have a dedicated bailer)
- ☐ Camera or Phone/Tablet with Camera
- ☐ Sampling Jars/Collection Equipment for Contingent Sampling
- ☐ Permanent Marker and Field Book
- ☐ Oil-absorbent Pads and Trash Bags
- ☐ Drum Labels
- ☐ Other:_____________________________

5.0 DOCUMENT LIST

The following documents are required, at a minimum, for the AKRF Field Professional, for the AKRF Professional utilizing this SOP:

- AKRF Company-wide and/or Site-Specific HASP
- AKRF Site-Specific Scope of Work [e.g., Phase II Work Plan, Remedial Investigation (RI) Work Plan, or Proposal]
- Scaled Figures/Maps/Drawings showing Proposed and/or Existing Monitoring Well Locations (See Attachment A for a Figure Example)
- Monitoring Well Gauging Logs (Field Logs) from any previous gauging or installation
- AKRF Monitoring Well Gauging Logs (see Attachment B for the Monitoring Well Gauging Log Template and a finished example), to be completed during implementation of this SOP
- Related SOPs listed in Section 3.0

6.0 WELL GAUGING

Well gauging can be performed separately from or in conjunction with the purging and sampling of a well. In either case, use the procedure presented below.

1. Always attempt to gauge wells in the order of cleanest to most contaminated to minimize adverse effects of potential cross-contamination.
2. Don safety equipment, as required by the HASP.
3. Locate the well using the scaled Figure/Maps/Drawings (see Attachment A). Use a measuring wheel or tape, if necessary.
4. Remove any cover and locking cap and measure the vapor concentration in the well with a PID immediately after opening.
5. The gauging measurement should be taken to the surveyed mark on the rim of the well casing, if present, or the rim of the well protector (traffic box or standpipe). If you do not know where that point is, consult the AKRF Project Manager.

   Generally, the survey point will be a filed or chiseled notch marked with paint or permanent ink. If you cannot determine where the mark is, take measurements from the highest point on the well casing, the lip of the well protector, and the top of the well protector. If the well casing is flat and even, take the measurement from the north side of the well casing. If the notch is missing, make the appropriate notch in the well casing. Make a notation as to which measurements were taken from which reference points. It is extremely important to measure to the same point each time a well is gauged. If you find a survey mark that is not clearly visible, take the time to mark it with permanent ink or paint. If the well appears to have been damaged or altered in such a way that the top of the well casing or well protector elevation might have changed, note this. Take a photograph of the well, if necessary, to document any alteration. When gauging from a survey mark, gauge the rim of the riser adjacent to the notch, not the bottom of the notch.
6. Clean and dry the oil-water interface meter (see SOP #H-SI-12: Decontamination), then slowly lower it into the well until it registers the presence of water (or NAPL). Record the depth to water (and to NAPL if the probe detects it) to the nearest 0.01 foot on the monitoring well gauging log.
7. Depth to the bottom of the well should be verified periodically (at least once a year) to determine whether silt is depositing in the bottom of the well. If the well is to be purged and sampled, the

depth to the bottom must be known in order to calculate the volume of purge water. When gauging depth to the bottom of a well, be aware of the documented depth to the bottom and lower the probe slowly to avoid damaging the probe sensor when it contacts bottom or stirring up deposited silt. After gauging to the bottom of the well, the entire length of tape that was submerged must be decontaminated.

8. Check gauging depth several times before recording it. Compare current measurements to previous measurements. Re-gauge any wells showing large, unexplainable discrepancies.
9. Note any unusual occurrences such as bacterial buildup on equipment. It is important to keep field instruments clean. Always decontaminate and dry the meter's tape before reeling it back into the housing. Use a clean rag or paper towel.
10. If present, measure the thickness of the NAPL layer in the well. NAPL may be present as a light-non-aqueous phase liquid (LNAPL) floating on the water table or a dense non-aqueous phase liquid (DNAPL) that has settled at the bottom of the well, below the water table. To detect NAPL, a meter with a measuring tape connected to an oil-water interface probe (may also be called a multi-phase interface probe) must be used. Measure the NAPL thickness as follows:
    a. If gauging for the presence of LNAPL, slowly lower the meter's probe into the well casing. The meter's alarm will emit a continuous beep when it contacts the surface of the LNAPL. Document the gauging measurement to the top of the LNAPL as indicated in Step #5 of this Section. Continue to slowly lower the probe until the alarm changes to an intermittent beep, which indicates the interface between the bottom of the LNAPL and groundwater. Document the gauging measurement to the LNAPL/groundwater interface as indicated in Step #5. The probe can be slowly raised and lowered to obtain more accurate measurements. The LNAPL thickness is the difference between the two readings. If the thickness is less than 0.01 foot, describe the thickness as a "sheen."
    b. If gauging for the presence of DNAPL, the probe on the oil-water interface meter must be capable of detecting separate phase solvents in addition to DNAPL hydrocarbons (e.g., coal tar). The probe must be carefully lowered to the bottom of the well until it intercepts the interface between groundwater and DNAPL, which will be indicated by the meter's alarm changing from an intermittent beep to a continuous beep. Document this measurement as indicated in Step #5 of this Section. Then, lower the probe and measure the depth to the bottom of the well. The thickness of DNAPL in the well is the difference between these two measurements. Repeat measurements to obtain more accurate results.
    c. Transparent bailers may be also used to detect, and even provide indication of, the thickness of NAPL. Although this qualitative method for measuring NAPL thickness is not accurate compared to a direct well measurement, it may be required when thicker product types (i.e., #6 fuel oil) are present. However, the oil-water interface probe may have a tendency to detect a NAPL false positive, as the probe can be easily covered in the thicker NAPL (the completed Monitoring Well Gauging Log should identify how the NAPL measurement was collected). Slowly lower the bailer through the fluid column to span the NAPL layer, then slowly withdraw the bailer and measure the NAPL thickness within it. See Section 7.0 for detailed procedures for collecting NAPL samples, and always handle bailers over oil-absorbent pads to absorb any NAPL that may be inadvertently spilled.
11. If NAPL is detected in a well where NAPL has not been detected before or has not been detected in several gauging events, verify the reading with a bailer, then communicate this finding to the

Project Manager. Note the color and clarity of the NAPL in the field book, and whether it smells like gasoline, diesel, or has some other type of odor. Consult with the Project Manager about the need for spill reporting.

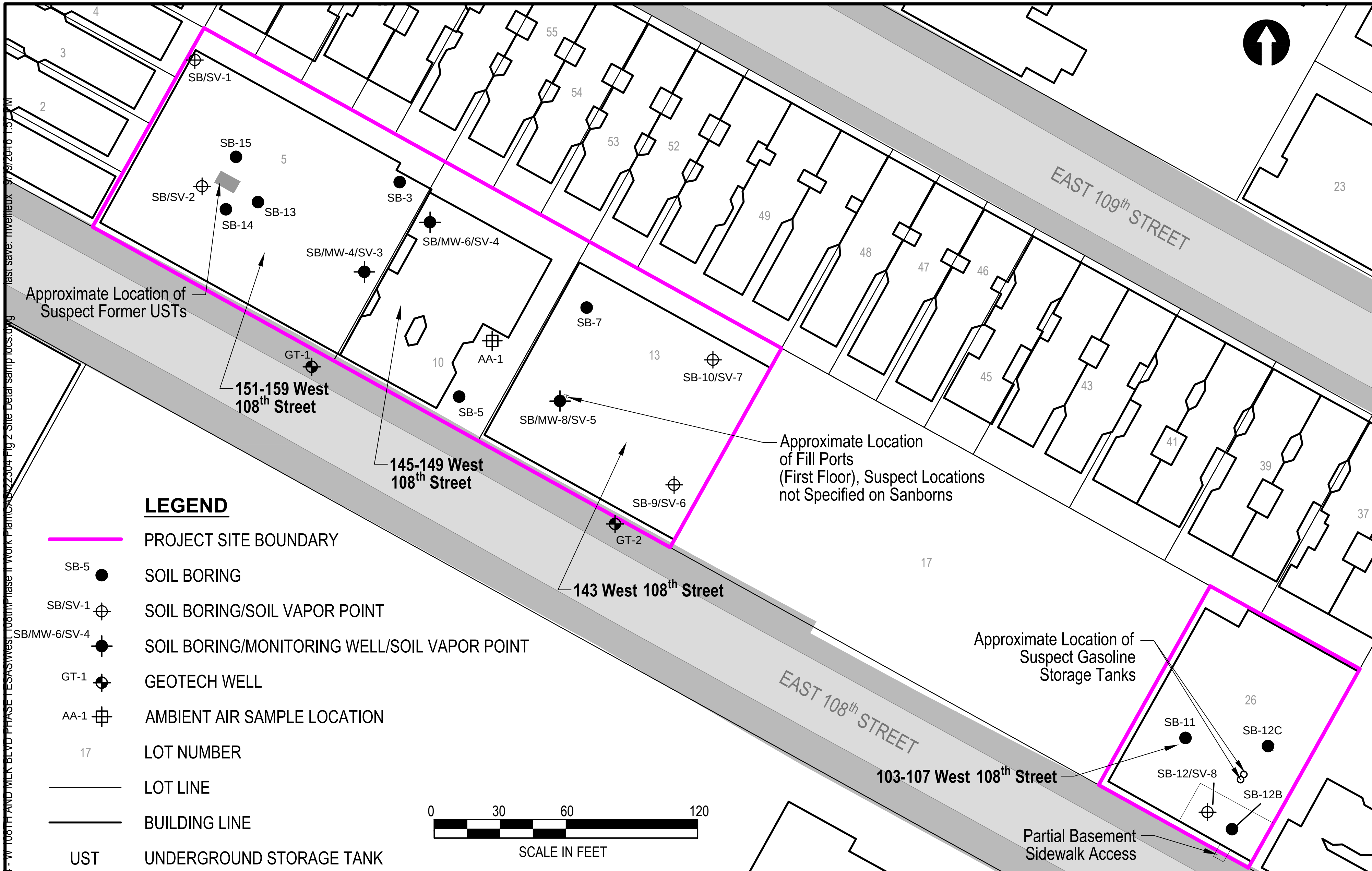
12. The actual length of the tape of a measuring device should be checked periodically against a new steel tape, as electronic tapes will tend to stretch with age. If the tape has stretched to a point where the taping error is more than 0.05%, it must be replaced.
13. After gauging each well, decontaminate the instrument before gauging the next well. Refer to SOP #H-SI-12 for decontamination procedures.

7.0 COLLECTION OF NAPL

LNAPL: To collect an LNAPL sample, slowly lower a single-check valve or double check-valve bailer through the LNAPL layer and into the underlying water column, taking care to allow as little water as possible to enter the bailer. Upon retrieval of the bailer, decant water into a drum or a bucket by carefully opening the check valve at the bottom of the bailer. Finally, fill the sample container(s) with LNAPL by pouring from the top of the bailer. Repeat this process until all sample containers are filled or until no more LNAPL can be recovered from the well.

DNAPL: To collect a DNAPL sample, slowly lower a weighted double check valve bailer to the bottom of the well. Carefully retrieve the bailer, and upon retrieval, decant water into a drum or a bucket by pouring from the top of the bailer. Finally, fill the sample container(s) with DNAPL by opening the check valve at the bottom of the bailer. Repeat this process until all sample containers are filled or until no more DNAPL can be recovered from the well.

ATTACHMENT A:
EXAMPLE FIGURE



Map Source:
NYCDCP (NYC Dept. of City Planning 2015) GIS database

103-107 and 143-159 West 108th Street
New York, New York

SITE PLAN INDICATING SAMPLING LOCATIONS

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

DATE
9/19/2016

PROJECT NO.
22304

FIGURE
2

ATTACHMENT B:
EXAMPLE & MONITORING WELL GAUGING LOG TEMPLATE

Well Gauging Field Log

Project: ____________________
Project Location: ____________________
Gauging Event (Quarter/Year): ____________________
Date: ____________________
AKRF Field Staff: ____________________

Well Identification	**PID Headspace Reading** (ppm)	**Depth To Bottom of Well** (feet)	**Depth To Water** (feet)	**Depth To NAPL** (feet)	**Bottom Depth of NAPL** (feet)	**NAPL Thickness** (feet)	**NAPL Thickness Measurement Method** (Oil-Water Interface Probe or Bailer)	**Observations** (NAPL, Odor, Sheen, Etc.)	**Notes** (Well Condition, Bolts Missing, Etc.)
Notes:		ppm - parts per million		N/A - not applicable			NAPL - non aqueous phase liquid		

Well Gauging Field Log

AKRF

Project: Project A
Project Location: Bronx
Gauging Event (Quarter/Year): 3rd Quarter
Date: 10/31/18
AKRF Field Staff: K. Wiles

Well Identification	PID Headspace Reading (ppm)	Depth To Bottom of Well (feet)	Depth To Water (feet)	Depth To NAPL (feet)	Bottom Depth of NAPL (feet)	NAPL Thickness (feet)	NAPL Thickness Measurement Method (Oil-Water Interface Probe or Bailer)	Observations (NAPL, Odor, Sheen, Etc.)	Notes (Well Condition, Bolts Missing, Etc.)
MW-1	ND	25.21	19.11	ND	—	—	—	—	Good
MW-2	20.1	35.17	19.92	18.73	19.92	1.19	O/W Probe	NAPL, odor	Missing one Bolt
MW-3	170	34.98	21.72	21.51	21.72	0.21	O/W Probe	NAPL, odor	Gripper plug broken
MW-4	217	37.12	20.18	36.58	37.12+	0.54+	O/W Probe; Bailer	NAPL	Lid doesn't sit tight

Notes: ppm - parts per million N/A - not applicable NAPL - non aqueous phase liquid

END OF SOP

APPENDIX J

RESPONSIBILITIES OF OWNER AND REMEDIAL PARTY

(RESERVED AS A PLACEHOLDER)