Sonero Metro City Auto Site

BRONX COUNTY

BRONX, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C203148

Prepared for:

Whitlock Point LLC and Whitlock Point Services LLC

5959 Broadway, Suite 3

Bronx, NY 10463

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

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DECEMBER 2023

CERTIFICATION STATEMENT

I FUAD DAHAN certify that I am currently a NYS registered professional engineer as in defined in 6 NYCRR Part 375 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).

_____ P.E

12/15/2023 DATE

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SITE MANAGEMENT PLAN

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LIST OF ACRONYMS

Acronym	Definition
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
COC	Certificate of Completion
CSA	Carlin, Simpson & Associates
DER	Division of Environmental Remediation
DER-10	NYSDEC Technical Guidance for Site Investigation & Remediation
DUSR	Data Usability Summary Report
ECs	Engineering Controls
EE	Environmental Easement
FER	Final Engineering Report
ft-bgs	feet below ground surface
HASP	Health and Safety Plan
ICs	Institutional Controls
MEK	Methyl Ethyl Ketone
MW	Monitoring Well
ng/l	nanograms per liter
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAHs	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PFAS	Per and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
OSHA	Occupational Safety and Health Administration
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RRSCOs	Restricted Residential Soil Cleanup Objectives

Acronym	Definition
RSCOs	Residential Soil Cleanup Objectives
SCO	Soil Cleanup Objectives
SWPPP	Storm Water Pollution Prevention Plan
SESI	SESI Consulting Engineers, DPC
SMP	Site Management Plan
SOE	Support of Excavation
SRI	Supplemental Remedial Investigation
SSDS	Sub-Slab Depressurization System
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
SVOCs	Semi-Volatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TOGS	Technical and Operations Guidance Series
USCO	Unrestricted Use Soil Cleanup Objectives
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

ES 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: No C203148 Sonero Metro City Auto Site

Institutional Controls:	1. The property may be used for residential, restricted residential, commercial, and industrial;
	2. The BCP Site has achieved a conditional Track 1 unrestricted use remedy with remaining contamination in soil vapor, with the exception of a 1,628 ft^2 area at the south end of the Site (designated as Parcel 1) where a Track 2 residential use remedy was achieved.
	3. Environmental Easement (EE) and an SMP until soil vapor requirements have been met, which is anticipated to be less than five (5) years, the SMP will not be needed anymore and EE will be rescinded.
Engineering Controls:	1. Soil Vapor Extraction System

Inspections:	Frequency
1. Soil Vapor Extraction System Inspection	Monthly (to transition to Quarterly after 3 months)
2. Vapor Point Inspection	Annually
Monitoring:	
1. Soil Vapor Extraction System Influent and Effluent	Monthly (to transition to Quarterly after 3 months)
2. Sub-Slab Soil Vapor and Indoor Air (Soil Vapor Evaluation)	Conducted prior to building occupancy and during the heating season.
Reporting:	
1. Vapor Extraction Influent and Effluent Data	Quarterly
2. Sub-Slab Sampling Data Summary Letter	3 weeks after each sampling event

Site Identification: No C203148 Sonero Metro City Auto Site

3. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

INTRODUCTION

1.1 GENERAL

This Site Management Plan is a required element of the remedial program for the Sonero Metro City Auto Site located in Bronx, New York (hereinafter referred to as the "Site"). See Site Location Map presented as **Figure 1.1**. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C203148, which is administered by New York State Department of Environmental Conservation (NYSDEC).

Whitlock Point LLC and Whitlock Point Services LLC entered into a Brownfield Cleanup Agreement (BCA) on October 21, 2021 with the NYSDEC to remediate the site. The BCA was amended in October 2023 to reduce the size of the Site by 0.056 acres, due to structural limitations. A figure showing the site location and boundaries of this site is provided in **Figure 1.2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in **Appendix A**.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". This includes soil contamination exceeding Unrestricted Use Soil Cleanup Objectives (USCOs) at the south end of the Site (referred to as Parcel 1), and potential soil vapor contamination along the western site boundary. Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining soil vapor contamination to ensure protection of public health and the environment. No ICs or ECs are required to address the remaining soil contamination as it does not exceed Residential SCOs. An Environmental Easement, granted to the NYSDEC and recorded with the Bronx County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan 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 only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are 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);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Site #C203148) 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 SESI Consulting Engineers, D.P.C., on behalf of Whitlock Point, LLC and Whitlock Point Services, LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 REVISIONS

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is 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:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.

2. 7-day advance notice of any field activity associated with the remedial program.

3. 15-day advance notice of any proposed ground-intrusive activity. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. Notice within 48 hours of 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.

5. Notice within 48 hours of any non-routine maintenance activities.

6. 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.

7. 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:

8. 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.

9. 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 1.1 includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B**.

Table 1.1: Notifications*

Name	**Contact Information**	**Required Notification****
Michael MacCabe	518-402-9687 michael.maccabe@dec.ny.gov	All Notifications
Sarah Quandt	518-402-9116 sarah.quandt@dep.ny.gov	All Notifications
Kelly Lewandowski NYSDEC Site Control	518-402-9553 kelly.lewandowski@dep.ny.gov	Notifications 1 and 8
Angela Martin	518-473-4671 angela.martin@health.ny.gov	Notifications 4, 6, and 7

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

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 SITE LOCATION AND DESCRIPTION

The site is located at 1001 Whitlock Avenue in the Bronx, Bronx County, New York and is identified as Block 2756 and Lot 85 on the Bronx County Tax Map (see **Figure 1.2**). The site is an approximately 0.788-acre area and is bounded by a vacant former industrial building to the north followed by 165th Street, Aldus Street to the south, Whitlock Avenue to the east, and residential properties followed by Longfellow Avenue to the west (see **Figure 1.3** – Site Plan Map). The boundaries of the site are more fully described in **Appendix A** –Environmental Easement. The owner(s) of the site parcel(s) at the time of issuance of this SMP is/are:

Whitlock Point, LLC and Whitlock Point Services, LLC

2.2 PHYSICAL SETTING

2.2.1 LAND USE

The Site consists of a vacant lot currently being redeveloped. The Site is zoned residential and is currently undergoing construction as part of redevelopment as a 14-story residential building.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial, residential and industrial properties. The properties immediately south of the Site include former commercial properties; the properties immediately north of the Site include commercial and industrial properties; the properties immediately east of the Site include institutional (Metropolitan Transit Authority) properties; and the properties to the west of the Site include residential properties.

2.2.2 GEOLOGY

Based on soil borings conducted by PVE, Carlin, Simpson & Associates (CSA) and SESI, subsurface geology generally consisted of brown to black fine to coarse sand, mixed with traces of gravel, silt, bricks and crushed concrete (fill) to depths of 2 to 13 feet ft-bgs. Results of CSA's geotechnical study identified that the fill is underlain by dense brown coarse to fine sands, silt, and gravel to depths of 20 to 29 ft-bgs. Weathered schist bedrock was encountered at depths ranging from 20 to 33 ft-bgs. Weathered bedrock was encountered during the remedial excavation at depths as shallow as 13-15 ft-bgs in certain areas.

2.2.3 HYDROGEOLOGY

Groundwater was encountered at depths ranging from 9 to 18.6 ft-bgs in September 2017 and December 2017 in soil borings performed by PVE and CSA. During the SRI, groundwater was encountered at depths between 18 and 21 ft bgs, corresponding to elevations ranging from 23.98 to 15.42 ft-amsl. All the wells were installed to depths between 19 and 25 ft-bgs and constructed utilizing two (2)-inch PVC pipe with 10 feet 0.020-inch slot screen. The PVC screen was surrounded by #2 filter sand. The filter sand was extended at least approximately one (1) foot above the screen. Bentonite approximately one (1) to two (2) feet thick was then placed on top of the filter sand and the remaining annular space around the PVC riser was grouted with cement/bentonite mix. Groundwater flow was determined to be to the north across the Site during the SRI. A groundwater contour map is included as **Figure 2.1**.

2.3 INVESTIGATION AND REMEDIAL HISTORY

The Site is located in an area characterized by a mix of residential, commercial, industrial, and manufacturing developments. The Site is currently undergoing construction of a 14-story residential apartment building. The Site is bounded by a vacant lot to the north followed by 165th Street, Aldus Street to the south, Whitlock Avenue to the east, and residential properties followed by Longfellow Avenue to the west. Historically, the Site was improved with “auto sales” or “garages” and a gas filling station located at the southernmost extent of the Site from the 1950s to 1977. The Site was identified as Sonero Auto Repair from 1999 to 2012 and was also operated as Metro City Auto Repair. Four (4) 1,000-gallon gasoline underground storage tanks (USTs) were closed in place at the Site on December 1, 1999.

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 referenced below are provided in Section 8.0 - References. The original Remedial Investigation Report (RIR) incorporated pre-BCP investigations detailed in Section 2.3.1 below.

2.3.1 PHASE II ENVIRONMENTAL SITE ASSESSMENT (ESA) AND REMEDIAL INVESTIGATION (RI) SUMMARY

Prior Phase II Field investigation activities were completed by PVE between February 2016 and September 2017, and by SESI in October 2019, and are summarized below:

- PVE advanced seven (7) soil borings, installed (2) monitoring wells, and placed 12 temporary soil vapor sampling points. PVE collected seven (7) soil samples (i.e., SB-01, SB-02, SB-03, SB-04, SB-06, SB-07, SB-08), two (2) groundwater samples (i.e., MW-3 and MW-4), and nine (9) soil vapor samples (SV-1, SV-4, SV-5, and SV-8 through SV-13).
- SESI advanced 12 soil borings and installed three (3) soil vapor points. SESI collected 12 soil samples (SESI-1 through SESI-12) and three (3) soil vapor samples (SV-14, SV-15, SV-16).

The soil and groundwater samples that were collected were analyzed for TCL/TAL +30 including metals, SVOCs, volatile organic compounds, cyanide, PCBs, and pesticides. The soil vapor samples were analyzed for VOCs in accordance with EPA Method TO-15. SESI prepared a remedial investigation report (RIR) that combined both investigations.

The analytical results of the soil samples were compared to the NYSDEC soil cleanup objectives (SCOs) and the constituent concentrations in groundwater were compared to the applicable NYSDEC TOGS AWQS.

Soil Investigation Results

Table 2.1 below provides a summary of the soil exceedances. Based on the soil sampling results, the following conclusions were made:

- The overall depth of impacted soils exceeding the USCOs ranged from 2 to 14 ft-bgs.
- Metals exceeding the USCOs were identified on the Site at depths up to 14 ft-bgs.
- SVOC and metals exceeding both USCO, Residential Use Soil Cleanup Objectives (RSCOs), and RRSCOs were identified in soils at depths ranging from 2 to 8 ft-bgs.

Table 2.1: RIR Summary of Exceedances in Soil

LOCATION					SB-02		SB-03		SB-06		SB-07		SB-08		SESI-1 (2)	
SAMPLING DATE					2/2/2016		2/2/2016		2/2/2016		2/2/2016		2/2/2016		10/16/2019	
SAMPLE TYPE					SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DEPTH (ft.)					6-8		6-8		13-14		3-3.5		9-10		2-2.5	
	USCO	PGSCO	RRSCO	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Semivolatile Organics by GC/MS																
Benzo(a)anthracene	1	1	1	mg/kg	0.343	U	**1.05**		0.356	U	0.327	U	0.349	U	**0.36**	
Benzo(b)fluoranthene	1	1.7	1	mg/kg	0.343	U	**0.602**		0.356	U	0.327	U	0.349	U	**0.4**	
Chrysene	1	1	3.9	mg/kg	0.343	U	**1.08**		0.356	U	0.327	U	0.349	U	**0.31**	
Indeno(1,2,3-cd)pyrene	0.5	8.2	0.5	mg/kg	0.343	U	**0.594**		0.356	U	0.327	U	0.349	U	**0.2**	
Total Metals																
Barium, Total	350	820	400	mg/kg	**111**		**105**		**103**		**168**		**162**		**1040**	
Copper, Total	50	1720	270	mg/kg	**33.2**		**28.1**		**22**		**43.8**		**38.2**		**90.4**	
Lead, Total	63	450	400	mg/kg	**64.5**		**103**		**134**		**341**		**139**		**246**	
Manganese, Total	1600	2000	2000	mg/kg	**818**		**1570**		**143**		**278**		**1110**		**165**	
Mercury, Total	0.18	0.73	0.81	mg/kg	**0.174**		**0.122**		**0.0688**		**0.12**		**0.0392**		**0.355**	
Nickel, Total	30	130	310	mg/kg	**21.1**		**27.9**		**19.8**		**18.4**		**27.8**		**11.8**	
Silver, Total	2	8.3	180	mg/kg	0.599	U	0.566	U	0.633	U	0.54	U	0.591	U	0.888	U
Zinc, Total	109	2480	10000	mg/kg	**85.2**		**80.1**		**60.2**		**699**		**286**		**467**	
Volatile Organics by EPA 5035																
Acetone	0.05	0.05	100	mg/kg	**0.396**	JL	0.0352	U	0.0442	U	0.0387	U	0.408	U	0.016	U

LOCATION					SESI-3 (4)		SESI-6 (3)		SESI-7 (5)		SESI-8 (4)		SESI-9 (4)		SESI-10 (4)		SESI-12 (4)	
SAMPLING DATE					10/16/2019		10/16/2019		10/16/2019		10/16/2019		10/16/2019		10/17/2019		10/17/2019	
SAMPLE TYPE					SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DEPTH (ft.)					4-4.5		3-3.5		5-5.5		4-4.5		4-4.5		4-4.5		4-4.5	
	USCO	PGSCO	RRSCO	Units	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q	Results	Q
Semivolatile Organics by GC/MS																		
Benzo(a)anthracene	1	1	1	mg/kg	**1.2**		0.11	U	**0.073**	J	0.11	U	0.11	U	**0.42**		**0.068**	J
Benzo(b)fluoranthene	1	1.7	1	mg/kg	**1.2**		0.11	U	**0.095**	J	0.11	U	0.11	U	**0.58**		**0.09**	J
Chrysene	1	1	3.9	mg/kg	**1**		0.11	U	**0.067**	J	0.11	U	0.11	U	**0.43**		**0.065**	J
Indeno(1,2,3-cd)pyrene	0.5	8.2	0.5	mg/kg	**0.62**		0.14	U	**0.046**	J	0.15	U	0.15	U	**0.26**		**0.045**	J
Total Metals																		
Barium, Total	350	820	400	mg/kg	**161**		**143**		**231**		**118**		**104**		**110**		**277**	
Copper, Total	50	1720	270	mg/kg	**30**		**40**		**77**		**33.2**		**30.8**		**45.4**		**55.3**	
Lead, Total	63	450	400	mg/kg	**471**		**8.76**		**499**		**88**		**96**		**31.6**		**109**	
Manganese, Total	1600	2000	2000	mg/kg	**319**		**2830**		**344**		**347**		**357**		**242**		**318**	
Mercury, Total	0.18	0.73	0.81	mg/kg	**0.104**		0.068	U	**6.54**		**0.347**		**0.384**		0.097	U	**0.208**	
Nickel, Total	30	130	310	mg/kg	**15.2**		**31.1**		**14.8**		**18.6**		**14.6**		**25.9**		**20.2**	
Silver, Total	2	8.3	180	mg/kg	0.968	U	**0.816**	J	**2.9**		**0.267**	J	0.884	U	1.04	U	0.942	U
Zinc, Total	109	2480	10000	mg/kg	**116**		**86.1**		**220**		**187**		**114**		**147**		**586**	
Volatile Organics by EPA 5035																		
Acetone	0.05	0.05	100	mg/kg	0.012	U	0.012	U	0.012	U	0.012	U	**0.025**		**0.015**		0.012	U

Notes:

1. Mg/Kg – milligrams per kilogram
2. Bold cell = compound detected
3. Q – Data Qualifier
4. J = Estimated Concentration
5. U = Undetected
6. Yellow shading = Compound Exceeds the USCO
7. Orange shading = PGSCO = Protection of groundwater SCO
   Red shading = Compound Exceeds the RRSCO

Groundwater Investigation Results

Table 2.2 below provides a summary of the groundwater exceedances. Based on the groundwater sampling results, the following conclusions were made:

- The depth to groundwater ranged from 9 to 18 ft-bgs and groundwater flows in a northerly direction across the Site.
- The Site's groundwater has been impacted with the chlorinated VOC (CVOC)

tetrachloroethylene (PCE) and metals above TOGS AQWS near the northern portion of the Site.

- The CVOC chloroform was detected above the TOGS AQWS near the southern portion of the Site.

Table 2.2: RIR Summary of Exceedances in Groundwater

Well ID			**MW-3**		**FD-MW-3**		**MW-4**	
Sampling Date			**9/26/2017**		**9/26/2017**		**9/26/2017**	
Analyte	AWQS	Unit	Result	Q	Result		Result	Q
Chloroform	7	ug/l	ND< 0.2	U	ND< 0.2		**9.8**	
Tetrachloroethylene (PCE)	5	ug/l	**11**		**12**		**1.2**	
Total Metals (Unfiltered)								
Manganese	300	ug/l	**1020**		**1140**		**230**	
Sodium	20,000	ug/l	**85200**	**B**	**85400**		**12300**	
Dissolved Metals								
Iron	300	ug/l	**561**		**757**		**133**	
Manganese	300	ug/l	**1020**		**1150**		**3110**	
Sodium	20,000	ug/l	**75200**	**B**	**75100**		**11600**	

Notes:

1. Ug/L – micrograms per liter
2. Bold cell = compound detected
3. Q = Data Qualifier
4. B = Compound detected in lab blank data qualifier
5. Yellow shading = Compound Exceeds the TOGS AWQS

Soil Vapor Investigation Results

Table 2.3 below provides a summary of the VOC detections in soil vapor. Based on the soil vapor sampling results, the following conclusions were made:

- The CVOCs PCE, trichloroethylene (TCE), and methylene chloride were detected in soil vapor points on the western portion of the Site.
- The petroleum hydrocarbon (PHC) VOCs 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,3 butadiene, benzene, ethylbenzene, xylenes, heptane, hexane, and toluene were detected in soil vapor.

Table 2.3: RIR Summary of VOC Detections in Soil Vapor

Sample ID	SV-1		SV-4		SV-5		SV-8		SV-9		SV-10	
Date Sampled	2/1/2016		2/1/2016		2/1/2016		8/18/2017		8/18/2017		8/18/2017	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,2,4-Trimethylbenzene	ND	U	**1.3**	D	ND	U	**56**	D	**63**	D	ND	U
1,3,5-Trimethylbenzene	ND	U	ND	U	ND	U	**22**	D	**26**	D	ND	U
1,3-Butadiene	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Acetone	**20**	D	**24**	**D**	**160**	**D**	**760**	D	**510**	D	**1100**	D
Benzene	ND	U	ND	U	ND	U	**9.7**	D	**11**	D	**46**	D
Ethylbenzene	ND	U	ND	U	ND	U	**52**	D	**51**	D	**75**	D

Xylenes	ND	U	**3.8**	D	ND	U	**274**	D	**286**	D	**311**	D
Methyl Ethyl Ketone (2-Butanone)	ND	U	**2.6**	D	**8.5**	**D**	**23**	D	**11**	D	**47**	D
Methylene Chloride	ND	U	ND	U	ND	U	**13**	**D**	ND	U	ND	U
N-Heptane	ND	U	**4.9**	**D**	ND	U	**27**	D	**22**	D	**88**	D
N-Hexane	ND	U	**5.3**	**D**	ND	U	**47**	D	**27**	D	**280**	D
Tetrachloroethylene (PCE)	**1200**	**D**	ND	U	ND	U	**590**	**D**	**100**	**D**	**230**	**D**
Toluene	ND	U	**2.5**	D	ND	U	**120**	D	**120**	D	**280**	D
Trichloroethylene (TCE)	**390**	**D**	ND	U	ND	U	ND	U	ND	U	**39**	**D**

Sample ID	SV-11		SV-12		SV-13		SV-14		SV-15		SV-16	
Date Sampled	8/18/2017		8/18/2017		8/18/2017		10/17/2019		10/17/2019		10/17/2019	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,2,4-Trimethylbenzene	**45**	D	**56**	D	**62**	D	0.983	U	**2.68**		**3.81**	
1,3,5-Trimethylbenzene	ND	U	**21**	D	**24**	D	0.983	U	0.983	U	2.46	U
1,3-Butadiene	ND	U	ND	U	ND	U	**5.66**		**0.883**		**32.5**	
Acetone	**670**	D	**310**	D	**400**	D	**575**		**553**		**1280**	
Benzene	ND	U	**16**	D	**8.3**	D	**3.96**		**1.85**		**7.6**	
Ethylbenzene	**63**	D	**51**	D	**51**	D	0.869	U	**1.21**		2.17	U
Xylene	**305**	D	**248**	D	**261**	D	**2.75**		**6.65**		**10.52**	
Methyl Ethyl Ketone (2-Butanone)	ND	U	**16**	D	**9.0**	D	**31.3**		**215**		**43.9**	
Methylene Chloride	**200**	**D**	**50**	**D**	ND	U	1.74	U	1.74	U	4.34	U
N-Heptane	**37**	D	**29**	D	**22**	D	**8.07**		**2.24**		**53.3**	
N-Hexane	**200**	D	**440**	D	**20**	D	**86**		**16.4**		**128**	
Tetrachloroethylene (PCE)	**74**	**D**	**430**	**D**	**74**	**D**	1.36	U	1.36	U	**15.4**	
Toluene	**170**	D	**150**	D	**130**	D	**5.8**		**3.84**		**9.87**	
Trichloroethylene (TCE)	ND	U	**2.2**	**D**	ND	U	**1.4**		1.07	U	2.69	U

Notes:
1. Result units in ug/m^3 (micrograms per kilogram)
2. Q – Data Qualifier
3. D = Detected
4. U = Undetected

2.3.2 SUPPLEMENTAL REMEDIAL INVESTIGATION

A Supplemental Remedial Investigation (SRI) was performed on the Site in February 2022 by SESI and conducted in general accordance with the Supplemental Remedial Investigation Work Plan, which was last revised on February 8, 2022, and subsequently approved by the NYSDEC on February 9, 2022.

The SRI consisted of collecting 30 soil samples from 10 boring locations and three (3) groundwater samples from three (3) monitoring wells. A description of the sampling activities for each media is included below.

Soil Investigation Results

Soil samples were collected in order to systematically investigate Site contamination on a Site-wide basis. The samples were analyzed for a combination of full target compound list (TCL) and target analyte list (TAL) analytes – which include volatile organic compounds (VOCs) (USEPA Method 8260), metals (USEPA Methods 6010/7471), semi-volatile organic compounds (SVOCs) (USEPA Method 8270), polychlorinated biphenyls (PCBs) and pesticides (USEPA Methods 8081/8082), per and polyfluoroalkyl substances (PFAS) (USEPA Method 537), and 1,4 dioxane (USEPA Method 8270). Duplicates and field blanks were collected for quality assurance/quality control (QA/QC) purposes.

One (1) PAH, indeno(1,2,3-cd)pyrene, was identified in one (1) sample from one (1) soil boring at a concentration exceeding both the USCO and RRSCO. Seven (7) metals including barium, cadmium, copper, lead, mercury, nickel, and zinc exceeded USCOs, with at least one (1) metal exceeding in 14 samples across nine (9) boring locations. Only barium exceeded the RRSCO in one sample. The maximum exceedance depth for metals was 15 ft-bgs. PFOS was detected in three (3) soil samples above its respective NYSDEC USCO. No exceedances of VOCs, PCBs, pesticides, or cyanide were identified in any of the soil samples collected above their respective USCOs.

Perfluorooctanesulfonic acid (PFOS) was identified in three (3) soil samples exceeding the USCOs. No exceedances of VOCs, PCBs, pesticides, or cyanide were identified above their respective USCOs in any of the soil samples collected. **Table 2.4A** below shows a summary of the soil exceedances.

Table 2.4A – SRIR Summary of Exceedances in Soil

Client Sample ID:	Units	USCO	RRSCO	RI-SB1 (14.5-15')	RI-SB2 (3.5-4')	RI-SB2 (9.5-10')	RI-SB4 (4.5-5')	RI-SB4 (14.5-15')	RI-SB5 (4.5-5')	RI-SB6 (4.5-5')
Date Sampled:				**2/14/2022**	**2/14/2022**	**2/14/2022**	**2/15/2022**	**2/15/2022**	**2/15/2022**	**2/15/2022**
Sample Depth (ft-bgs):				**14.5-15.0**	**3.5-4.0**	**9.5-10.0**	**4.5-5.0**	**14.5-15.0**	**4.5-5.0**	**4.5-5.0**
SVOC Analysis										
Indeno(1,2,3-cd)pyrene	ug/kg	500	500	21.5 J	76.9	ND (38)	33.2 J	ND (32)	50.7	164
Metals Analysis										
Barium	mg/kg	350	400	87.6	167	87.9	**404**	220	96.5	221
Copper	mg/kg	50	270	**65.1**	43.7 [j]	24.9 [j]	**52.2** [j]	26.7 [j]	47.3 [j]	**55.6** [j]
Lead	mg/kg	63	400	**69.2**	**87.7**	8.3	**63.8**	5.4	36	**101**
Mercury	mg/kg	0.18	0.81	0.18	0.18	ND (0.037)	ND (0.037)	0.052	0.075	0.15
Nickel	mg/kg	30	310	17.3	23.8	**30.4**	**34.1**	**49.4**	**31.3**	**301**
Zinc	mg/kg	109	10000	69.8	**224**	74.8	**265**	**112**	75.3	**177**

Client Sample ID:	Units	USCO	RRSCO	RI-SB6 (9.5-10')	RI-SB6 (12.5-13')	RI-SB7 (9.5-10')	RI-SB8 (4.5-5')	RI-SB8 (12.5-13')	RI-SB9 (4.5-5')	RI-SB9 (9.5-10')	R1-SB10 (2-2.5')
Date Sampled:				**2/15/2022**	**2/15/2022**	**2/16/2022**	**2/16/2022**	**2/16/2022**	**2/16/2022**	**2/16/2022**	**2/17/2022**
Sample Depth (ft-bgs):				**9.5-10.0**	**12.5-13.0**	**9.5-10.0**	**4.5-5.0**	**12.5-13.0**	**4.5-5.0**	**9.5-10.0**	**2.0-2.5**
SVOC Analysis											
Indeno(1,2,3-cd)pyrene	ug/kg	500	500	34.7 J	**573**	ND (39)	65.5	ND (36)	44	ND (35)	77.6
Metals Analysis											
Cadmium	mg/kg	2.5	4.3	ND (0.60)	ND (0.59)	ND (0.58)	0.6	ND (0.56)	ND (0.55)	ND (0.56)	**3.2**
Copper	mg/kg	50	270	39.0 [j]	27.2	**133** [j]	**78.0** [j]	21.9 [j]	46.6 [j]	35.4 [j]	39.6
Lead	mg/kg	63	400	**335**	10.4	12.7	25.5	6.5	**101**	16.5	**209**
Mercury	mg/kg	0.18	0.81	**0.31**	0.15	0.061	0.1	ND (0.033)	**0.24**	ND (0.036)	**0.33**
Nickel	mg/kg	30	310	23.3	25.8	**31.3**	**41.1**	**46.1**	24.7	**38.3**	28.9
Zinc	mg/kg	109	10000	96.7	58.5	71.8	**424**	**117**	**125**	103	**2270**

Footnotes:

mg/kg = Milligrams per kilogram
ug/kg = Micrograms per kilogram
ND = Not Detected
J = The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit (EDL)
[j] = Elevated detection limit due to dilution required for high interfering element.
USCO = NY Unrestricted Use Soil Cleanup Objectives (6 NYCRR 375-6 12/06)
RRSCO = NY Restricted Residential Use Soil Cleanup Objectives w/CP-51 (10/10) (6 NYCRR 375-6 12/06)
= Concentration exceeds USCOs
= Concentration exceeds RRSCOs

PFOS was detected in three (3) soil samples above its respective USCO. PFOA was not detected in any soil samples exceeding the guidance value. The PFOS exceedances are presented in **Table 2.4B** below.

Table 2.4B – SRIR Summary of Exceedances in Soil (PFAS)

Client Sample ID:	Units	NYSDEC Guidance Value	RI-SB2 (3.5-4')	RI-SB5 (4.5-5')	R1-SB10 (2-2.5')
Date Sampled:			**2/14/2022**	**2/15/2022**	**2/17/2022**
Sample Depth (ft-bgs):			**3.5-4**	**4.5-5**	**2-2.5**
PFAS Analysis					
Perfluorooctanesulfonic acid (PFOS)	ug/kg	0.880	1.1	10.9	8.5

Footnotes:

= Concentration exceeds NYSDEC Guidance Value

No exceedances of VOCs, PCBs, pesticides, or cyanide were identified in any of the soil samples collected above their respective USCOs.

Groundwater Investigation Results

Three (3) monitoring wells (MW-2R, MW-3R, and RI-MW-4) were sampled for TCL/TAL+30 (including VOCs, SVOCs, PCBs, pesticides, and metals), PFAS, and 1,4-dioxane. As shown in **Table 2.5** below, no VOCs, pesticides, PCBs, cyanide, or 1,4-dioxane were detected at concentrations in excess of the AWQS. Metals exceedances of the AWQS included three (3) common naturally occurring metals (iron, manganese and sodium), as well as lead and chromium in one (1) well. PFOA and PFOS were identified in excess of the NYSDEC Guidance value of 2.7 and 6.7 ng/l correspondingly in all three (3) wells.

Table 2.5 – SRIR Summary of Exceedances in Groundwater

Client Sample ID:	Units	NYSDEC AWQS or Guidance Value	MW-3R	RI-MW-4	MW-2R
Lab Sample ID:			JD40098-1	JD40006-2	JD40006-3
Date Sampled:			2/18/2022 & 2/22/2022	2/18/2022 & 2/22/2022	2/18/2022 & 2/22/2022
Matrix:			Ground Water	Ground Water	Ground Water
MS Semi-volatiles (SW846 8270E)					
Benzo(a)pyrene	ug/l	0	**0.67 J**	ND	**1.2 J**
PFAS (EPA 537M BY ID)					
Perfluorooctanoic acid	ng/l	6.7	**23.3**	**46.7**	**30.1**
Perfluorooctanesulfonic acid	ng/l	2.7	**15**	**12.1**	**52.8**
Metals Analysis					
Chromium	ug/l	50	ND	ND [d]	**211** [d]
Iron	ug/l	300	**3440**	**4490** [d]	**98200** [d]
Lead	ug/l	25	4.4	ND [d]	**216**
Manganese	ug/l	300	**2030**	**2720** [d]	**3890** [d]
Sodium	ug/l	20000	**31800**	**45300** [d]	ND [d]

Footnotes:

NYSDEC = New York State Department of Environmental Conservation.
AWQS = Ambient Water Quality Standards.
ug/l = Micrograms per liter.
ng/l = Nanograms per liter.
[d] = Elevated sample detection limit due to limited volume.
= Concentration of compound exceeds the NY TOGS Class GA GW Standard or applicable PFAS Guidance Value

Conceptual Site Model

Soils were found to have been impacted by PAHs and metals, and the overall depth of impacted soils ranged from 0 to 15 ft-bgs. One (1) PAH compound exceeding both the USCOs and the RRSCOs was identified at a depth of 12.5-13 ft-bgs. One (1) metal exceeding the RRSCOs was identified at a depth of 4.5-5 ft-bgs, and metals exceeding

the USCO extend down to 15 ft-bgs in two (2) locations (RI-SB-1 and RI-SB-4). No exceedances of VOCs, PCBs, pesticides, or cyanide were identified in any of the soil samples collected above their respective USCOs. However, elevated PID readings, visible staining, and petroleum odors were detected in soils in a limited area near the south end of the Site from 10-22 ft bgs, for which a spill was reported to NYSDEC.

In groundwater, exceedances of metals and PFOA/PFOS were noted. No VOCs, pesticides, PCBs, cyanide, or 1,4-dioxane were detected at concentrations in excess of the AWQS. Metals exceedances of the AWQS included three (3) common naturally occurring metals (iron, manganese and sodium), as well as lead and chromium in one (1) well. PFOA and PFOS were identified in excess of the NYSDEC guidance value of 10 ng/l in all three (3) wells. These PFOA/PFOS may be indicative of regional background contamination of PFOS/PFOA that is common to urban environments.

In soil vapor, the PHC VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,3 butadiene, benzene, ethylbenzene, xylenes, heptane, hexane, and toluene) and CVOCs (PCE, TCE, methylene chloride) detected have the potential to cause soil vapor intrusion into the future on-Site buildings. Precautionary vapor mitigation measures and a vapor intrusion evaluation are recommended for the Site's proposed enclosed areas in the future.

Groundwater was encountered in overburden soils in all three (3) wells installed during this SRI, and groundwater depths in overburden ranged from 18 to 21 feet bgs in these wells, flowing in a northerly direction. However, local groundwater flow direction can be affected by subsurface openings or obstructions such as basements and utilities, groundwater pumping and other factors.

2.3.3 UNDERGROUND STORAGE TANKS

A total of ten (10) USTs were removed from the Site during the remediation of the project. The fire department and NYSDEC were notified and noted that any releases are noted under NYSDEC spill number 21-09757. All tanks were assessed, cleaned and removed by certified tank contractor Riteway of Lindenhurst, New York. Any visually impacted soil was removed from the tank area and exported to Clean Earth of Carteret as part of the

soil remedy per the Remedial Action Work Plan (RAWP). These tanks are further documented in a closure report prepared by SESI Consulting Engineers included in Appendix H of the Final Engineering Report (FER).

2.4 REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated March 2023 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

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

Soil Vapor

RAOs for Public Health Protection

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

2.5 REMAINING CONTAMINATION

2.5.1 SOIL

The Site remedy has achieved Track 1 status for soil except for Grid cell RI-SB-10 as demonstrated by remedial excavation endpoint sample results meeting the USCOs as set forth in Table 375-6.8(a) for all soils above bedrock or bedrock survey points, the results of which were included in the FER and are summarized in Table 2.6 below**. Figure 2.2** shows all endpoint sample locations. Grid cell RI-SB-10 (designated as Parcel 1) has achieved a Track 2 residential for soil as demonstrated by remedial excavation endpoint

sample results meeting the residential soil cleanup objectives (RSCOs) as set forth in Table 375-6.8(b) for all soils in this grid. The contaminated soil was excavated to depths ranging from 6.5 to 18.5-ft bgs across most of the site and disposed off-site at permitted facilities.

Table 2.6 – Summary of Endpoint Sample Depths

Area	Endpoint Sample ID	Below USCOs or at Bedrock	
		Clean Endpoint Sample Depth (ft-bgs)	Elevation (ft-amsl)
RI-SB-01	EP-1-1	17	23.01
	EP-1-2	16	23.27
	EP-1-3	14 (Bedrock)	25.97
	EP-1-4	14 (Bedrock)	25.12
RI-SB-02	EP-2-1	13	27.97
	EP-2-2	12	28.36
	EP-2-3	13	27.04
	EP-2-4	12	27.96
RI-SB-03	EP-3-1	7.5	32.70
	EP-3-2	7.5	32.42
	EP-3-3	6.5	33.46
	EP-3-4	7	34.27
	EP-3-5	7	34.21
	EP-3-6	6.5	34.66
RI-SB-04	EP-4-1	16	26.46
	EP-4-2	15	27.29
	EP-4-3	16	26.17
	EP-4-4	16	26.19
	EP-4-5	16	26.34
RI-SB-05	EP-5-1	7.5	34.52
	EP-5-2	9.5	32.07
	EP-5-3	9.5	31.86
	EP-5-4	9.5	31.29
	EP-5-5	9.5	31.64
RI-SB-06	EP-6-1	15	27.92
	EP-6-2	16	28.29
	EP-6-3	15	28.31
	EP-6-4	14	30.47
RI-SB-07	EP-7-1	14 (Bedrock)	29.50
	EP-7-2	13 (Bedrock)	30.61
	EP-7-3	14 (Bedrock)	29.42
	EP-7-4	11	32.54
RI-SB-08	EP-8-1	15 (Bedrock)	29.63
	EP-8-2	15 (Bedrock)	30.39

Area	Endpoint Sample ID	Below USCOs or at Bedrock	
		Clean Endpoint Sample Depth (ft-bgs)	Elevation (ft-amsl)
	EP-8-3	15 (Bedrock)	30.83
	EP-8-4	15 (Bedrock)	30.80
RI-SB-09	EP-9-1	12	32.01
	EP-9-2	12	32.37
	EP-9-3	18.5	30.90

The excavation in RI-SB-10 (parcel 1) achieved a Track 2 cleanup for soils by removing the contaminated fill down to a maximum depth of 5 ft bgs. Endpoint sample EP-10-1 and EP-10-2 contained exceedances of total select metals above USCOs but below RSCOs as detailed in **Table 2.7** below. **Figure 2.2** indicates the location of all soil remaining on Site that exceeds Track 1 (unrestricted) SCOs. As the endpoint sample results do not exceed RSCOs, engineering and institutional controls are not required, and no groundwater, soil vapor or soil monitoring or sampling is proposed for this Track 2 area.

Table 2.7 – Summary of Sample Results Exceeding USCOs

Endpoint Sample ID	Analytical Exceedances	Concentration (mg/kg)	USCO / RSCO (mg/kg)	Sample Depth (ft-bgs) and Elevation (ft-amsl)	
				Est. Depth	Elevation
EP-10-1	Copper	54.9	50 / 270	5	37.68
	Lead	242	63 / 400		
	Mercury	0.251	0.18 / 0.81		
	Zinc	184	109 / 2,200		
EP-10-2	Lead	164	63 / 400	5	38.01
	Mercury	0.296	0.18 / 0.81		
	Zinc	191	109 / 2,200		

2.5.2 GROUNDWATER

In groundwater, one (1) SVOC, benzo(a)pyrene, exceeded the Ambient Water Quality Standards (AWQS) in two (2) wells. Metals exceedances of the AWQS included three (3) common naturally occurring metals (iron, manganese and sodium), as well as lead and chromium in one (1) well. Perfluorooctanoic acid (PFOA) and PFOS were identified in

excess of the NYSDEC Guidance Value of 10 nanograms per liter (ng/l) in all three (3) wells (see Table 2.5). Based on the limited exceedances of AWQS identified, no remedy was required for groundwater.

Groundwater use at the Site is subject to the ICs documented within the EE and is restricted for use as a source of potable or process water without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or New York City Department of Health and Mental Hygiene (NYCDOHMH).

2.5.3 SOIL VAPOR

As shown on **Table 2.3** above, the chlorinated volatile organic compounds (CVOC) PCE, TCE, and methylene chloride (MC) were detected in soil vapor points during pre-BCP investigations on the western portion of the Site at potentially elevated concentrations.

A soil vapor sample results plan is presented on **Figure 2.3.**

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 GENERAL

Since remaining contamination exists at the site, Institutional Controls and Engineering Controls 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 project manager.

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 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 project manager.

3.2 INSTITUTIONAL CONTROLS

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) manage the Site pursuant to this SMP and the Environmental Easement. 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 **Figure 3.1**. These ICs are:

- The property may be used for: unrestricted use, residential, restricted residential; commercial, or industrial use pursuant to the terms in this SMP and environmental easement;
- 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 underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or NYC Department of Environmental Protection 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 NYSDEC;
- Soil vapor and other environmental or public health 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;
- 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;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on **Figure 3.1**, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 ENGINEERING CONTROLS

3.3.1 SOIL VAPOR EXTRACTION SYSTEM

A soil vapor extraction (SVE) system has been installed along the western boundary of the property to address vapor phase CVOC contamination in the vadose zone identified during the RIs. The system consists of a series of six (6) approximately 44.50-ft horizontal 4-inch diameter slotted PVC pipes (0.010 in slot) connected via a 4” schedule 40 PVC trunk line, which is connected to an SVE blower (**Figure 3.2**).

The slotted pipes are between 7-8 ft-bgs in the coarse gravel fill material that is highly permeable. The PVC trunk line manifolds the six (6) SVE extraction points through a 4" schedule 40 PVC installed approximately one (1) to two (2) feet below ground. Each extraction point is equipped with a gate valve and quick connect sampling port to adjust the flow rate and collect samples.

The truck line is manifolded to the shed (8' x 20') at the northwestern portion of the Site, which leads to a condensation (knockout) tank to remove any moisture from the system and is then connected to the regenerative blower. The regenerative blower is then connected to one (1) 55-gallon granulated activated carbon (GAC) drum which will pass the vapor through the drum before exiting the shed at a riser vented above breathing level. Sampling ports will be installed before and after the GAC tower to monitor the influent and effluent stream.

A SVE pilot test was conducted to determine the wellhead vacuum pressure needed to achieve the desired flowrate and acceptable vacuum communication measured at remote vacuum monitoring points on-Site. The pilot test was conducted by connecting the regenerative blower to the piping and examining the pressure (via magnehelic gauges) and flow at each wellhead, as well as the differential pressures at 4' bgs on either side of each SVE riser and adjusting the gate valves beginning with SVE-1. The blower was adjusted to determine the optimal flow rate and each gate valve was adjusted to maintain a consistent and adequate vacuum pressure and flow rate in each well segment.

Procedures for operating and maintaining the Soil Vapor Extraction system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in **Appendix C** – Operations and Maintenance Manual. **Figure V-1** shows the location and layout of the SVE system.

3.3.2 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. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

The SVE system will not be discontinued unless prior written approval is granted by the NYSDEC project manager. In the event that influent concentrations for CVOCs including PCE, TCE, and Methylene Chloride are all not detected or detected at insignificant concentrations acceptable to NYSDEC and NYSDOH for two (2) consecutive quarters, a proposal to discontinue the system will be submitted by the remedial party to the NYSDEC project manager. The proposal will be presented as a letter work plan which will detail the temporary shutdown of the system and appropriate sampling procedures to assess rebound and potential exposure.

Conditions that may warrant discontinuing the SVE system include soil vapor that: (1) reach levels that all CVOCs are not detected or detected at insignificant concentrations acceptable to NYSDEC and NYSDOH for two consecutive quarters; (2) have become asymptotic to a low level over an extended period of time, as accepted by the NYSDEC; or (3) the NYSDEC has determined that the SVE system has reached the limit of its effectiveness. Systems will remain in place and operational until permission to discontinue their use is granted in writing by the NYSDEC project manager.

4.0 MONITORING AND SAMPLING PLAN

4.1 GENERAL

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix D**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- 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 Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 TREATMENT SYSTEM MONITORING AND SAMPLING

4.2.1 REMEDIAL SYSTEM MONITORING

Monitoring of the soil vapor extraction system will be performed on a routine basis, as identified in **Table 4.1** Remedial System Monitoring Requirements and Schedule (see below). The monitoring of remedial systems must be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the soil vapor extraction system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Soil vapor extraction system components to be monitored include, but are not limited to, the components included in **Table 4.1** below.

Table 4.1– Remedial System Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Individual well head	Flow Rate	10-30 CFM	Monthly (to transition to quarterly after 3 months)
Granulated Activated Carbon (GAC) Drum	Influent and Effluent EPA TO-15	Replace if less than 95% reduction in effluent CVOCs (PCE, TCE, MC) compared to influent (totals and individual concentrations)	Monthly (to transition to quarterly after 3 months)
Vacuum blower	Flow Rate	100-200 CFM	Monthly (to transition to quarterly after 3 months)

A complete list of components to be inspected is provided in the Inspection Checklist, provided in **Appendix E** - Site Management Forms. If any equipment readings are not within their specified operation range, any 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.

4.2.2 REMEDIAL SYSTEM SAMPLING

Samples shall be collected from the soil vapor extraction system influent and effluent streams on a routine basis. The influent data will determine what is being pulled from the soil, and the effluent data will help determine when GAC changeout is required. Sampling locations, required analytical parameters, and schedule are provided in **Table 4.2** – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4.2 – Remedial System Sampling Requirements and Schedule

Sampling Location	VOC (EPA Method TO-15)	Schedule
Influent Vapor Stream	X	Monthly (to transition to quarterly after 3 months)
Effluent		

Detailed sample collection and analytical procedures and protocols are provided in **Appendix F** – Field Sampling Plan and **Appendix D** – Quality Assurance Project Plan.

The remedial party will properly dispose of all wastes generated by the remedial system at off-site disposal facilities according to local, state and federal laws and regulations. Wastes will be tested before disposal to comply with the permit conditions of the disposal facility. No wastes are anticipated to be generated that would require disposal.

4.3 SOIL VAPOR INTRUSION SAMPLING

A soil vapor intrusion evaluation will be conducted during the heating season following construction of the sub-grade garage level that will be underlain by the vapor barrier/waterproofing membrane and the elements of the SSDS. The evaluation will be conducted prior to building occupancy and will include the collection of co-located sub-

slab vapor and indoor air samples. The evaluation will be conducted in accordance with the Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, with updates). The sample locations are noted in **Table 4.4** below and shown on **Figure V-2**.

The results of the evaluation will determine if soil vapor intrusion is occurring or has the potential to occur, and if the SSDS is required as an engineering control for the proposed building. If the results of the evaluation indicate that there is no potential for soil vapor intrusion, the SSDS will not be required as an engineering control pending approval of NYSDEC and NYSDOH. If the results indicate that there is potential for soil vapor intrusion, the following actions may be taken:

- The sub-slab ventilation piping may be connected to the SVE blower to convert the system to an SSDS;
- The garage ventilation system may be adjusted in such a way to help prevent intrusion of soil vapor;
- The building slab may be inspected for any potential leaks, and these will be sealed if present.

Table 4.4– Soil Vapor Intrusion Sampling Requirements and Schedule

Sampling Location	VOC (EPA Method TO-15)	Schedule
SV-1/IA-1	X	During heating season prior to building occupancy
SV-2/IA-2		
SV-3/IA-3		
SV-4/IA-4		
SV-5/IA-5		
AA-1		

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the soil vapor intrusion sampling program are specified in Section 7.0 – Reporting Requirements.

4.4 MONITORING AND SAMPLING PROTOCOL

All sampling activities will be recorded in a field book and associated sampling log as provided in **Appendix E** - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity) 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 Sampling Plan provided as **Appendix F** of this document.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 GENERAL

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. Details regarding the SVE system operation, monitoring, and sampling are discussed in Section 4.3.1 and 4.3.2 above. This Operation and Maintenance Plan:

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

Further detail regarding the Operation and Maintenance of the soil vapor extraction system components are provided in Sections 5.2 and 5.3 below and in **Appendix C** - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 REMEDIAL SYSTEM PERFORMANCE CRITERIA

Table 5.1 – Remedial System Minimum Operating Requirements

Remedial System Component	Monitoring Parameter	Minimum Operating Range
Individual well head	Flow Rate	10 CFM
GAC Drum	Influent and Effluent (EPA TO-15)	95% reduction in effluent CVOCs (PCE, TCE, MC) compared to influent (totals and individual concentrations)
Vacuum blower	Flow Rate	100 – 200 CFM

5.3 OPERATION AND MAINTENANCE OF SOIL VAPOR EXTRACTION SYSTEM

The following sections provide a description of the operations and maintenance of SVE system. Cut-sheets for the equipment and as-built drawings for the SVE system are provided in **Appendix C**.

5.3.1 SYSTEM START-UP AND TESTING

An Atlantic Blowers Model AB-900 (60 Hz) vacuum blower was installed in a shed to the north of the SVE wells on the western side of the building. The shed is aboveground for access and have all wells manifolding to one (1) trunk line. The remedial engineer has determined that the SVE system was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the western side of the Site to prevent vapor migration off-site to the west.

Blower Startup Procedure:

1. Inspect the installation prior to starting the fan. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge.
2. Check drive installation.
3. Check the tightness of all screws, nuts and bolts. When furnished, tighten hub setscrews.
4. Apply power and check for unusual sounds or excessive vibration. If either exists, see the section on Frequently Asked Questions.

NOTE: Shut the fan down immediately if there is any sudden increase in fan vibration.

The system testing described above will be conducted if, in the course of the soil vapor extraction system lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

5.3.2 ROUTINE SYSTEM OPERATION AND MAINTENANCE

Blower Maintenance Procedures:

Atlantic Blowers fans are manufactured to high standards with quality materials and components. Proper maintenance will ensure a long and trouble-free service life.

Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.

Inspection frequency is determined by the severity of the application and local conditions. Strict adherence to an inspection schedule is essential. Fan maintenance should include the following:

1. Preventative maintenance: After the first 500 hours (approx. 3 weeks) of operation, check the filter elements, noise absorbing foam and clean the motor and blower. Replace filter elements as needed. Inspect muffler once a month.
2. Bearing maintenance: Lubricate and replace with fresh grease every year.

5.3.3 NON-ROUTINE OPERATION AND MAINTENANCE

Replacement Parts:

It is recommended that only factory-supplied replacement parts be used. Atlantic Blowers fan parts are built to be fully compatible with the original fan, using specific alloys and tolerances. These parts carry a standard Atlantic Blowers warranty.

When ordering replacement parts, specify the part name, Atlantic Blowers shop and control number, fan size, type, arrangement and bearing size. Most of this information is on the metal nameplate attached to the fan base. For assistance in selecting replacement parts, contact your local Atlantic Blowers representative.

5.3.4 SYSTEM MONITORING DEVICES AND ALARMS

The soil vapor extraction system will have a warning device to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the soil vapor extraction system will be restarted. Operational problems will be noted in the Periodic Review Report 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.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

1. The site is not located in a floodplain.
2. During severe rain events low lying areas of the Site may experience brief flooding limiting access to vapor sampling points.
3. High winds are not expected to damage the soil vapor extraction points.
4. The mechanical components of the SVE system may be vulnerable to loss of electric power. However, due to the urban location of the Site, all power lines that service the Site are underground and the Site is therefore less vulnerable to loss of electric power from high winds.
5. No spill or containment areas exist on the Site that would cause a release during severe weather events.

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 Periodic Review Report (PRR).

- There will be very minimal waste generated during soil vapor monitoring (vapor tubing).
- There will be electrical energy usage associated with the operation of the SVE system, but otherwise no electrical energy usage associated with Site monitoring.
- The effluent from the SVE system will be treated with activated carbon prior to discharge, and therefore there should be no VOC emissions associated with the system. The effluent will be tested on a quarterly basis during operation of

the system. The activated carbon will be changed out on a regular basis to prevent any breakthrough emissions.

- The Site monitoring will not disturb the land and/or ecosystems.

6.2.1 TIMING OF GREEN REMEDIATION EVALUATIONS

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2. REMEDIAL SYSTEMS

Remedial systems will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate.

The inspections will evaluate the following:

- If Engineering Controls or Institutional Controls employed at the Site continue to perform as designed and continue to be protective of human health and the environment;
- If anything has occurred that impairs the ability of the Engineering Controls or Institutional Controls to protect public health and the environment;
- If changes are needed to the remedial systems or controls;
- If compliance with this SMP has been maintained;
- If site records are complete and up to date; and
- General Site conditions at the time of inspection.

In addition, if an emergency occurs, such as a natural disaster, or if an unforeseen failure of any of the Engineering Controls occurs, an inspection of the Site will be performed

within 30 days to evaluate the Engineering Controls, and a letter report of findings will be submitted to NYSDEC.

6.2.3 FREQUENCY OF SYSTEM CHECKS, SAMPLING, AND OTHER PERIODIC ACTIVITIES

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.2.4 METRICS AND REPORTING

As discussed in Section 7.0 and as shown in **Appendix E** – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed.

6.3 REMEDIAL SYSTEM OPTIMIZATION

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy 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.

An RSO will provide a critique of a 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 forms provided in **Appendix E**. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

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 of **Table 7.1** and summarized in the Periodic Review Report.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Quarterly
Soil Vapor Intrusion Evaluation Summary Letter	Three weeks after each sampling event
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections 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., sub-slab vapor, indoor air, outdoor air);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine 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).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and

- Other documentation such as copies of invoices for repair 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 NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix A** - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. 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, fire 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.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables 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 tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:

- Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
- O&M data summary tables;

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all 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 site-specific RAWP, ROD or Decision Document;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - 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;
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
  - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document; and
  - The overall performance and effectiveness of the remedy.

- A performance summary for all treatment systems at the site during the calendar year, including information such as:

  - The number of days the system operated for the reporting period;
  - The average, high, and low flows per day;
  - The contaminant mass removed and the cost per pound of mass removed during the certification period and during the life of the treatment system;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - Alarm conditions;

- Trends in equipment failure;
- A summary of the performance, effluent and/or effectiveness monitoring; and
- Comments, conclusions, and recommendations based on data evaluation. Recommendations must address how receptors would be impacted. Recommendations can include:
    - Proposals to address efficiency and costs such as: instituting remote operation, system changes to decrease maintenance costs and downtime, and system changes to decrease energy use; and
    - Proposals to modify or shut down a treatment system due to remediation completion, system performance or changed conditions. System shutdowns are addressed in Section 6.4 of DER-10.

7.2.1 CERTIFICATION OF INSTITUTIONAL AND ENGINEERING CONTROLS

Following the last inspection of the reporting period, a Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, 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;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by 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 NYSDEC to evaluate the remedy, including access to evaluate the continued maintenance of this control;*

- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *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*
- *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, Mark Stagg, of Whitlock Point, LLC, am certifying as Owner/Remedial Party for the site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

- *No new information has come to my attention, including groundwater monitoring data from wells located at the site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and*
- *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 project manager and the NYSDOH project manager. The Periodic Review Report may also 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 or failure to conduct

site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager 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 project manager.

7.4 REMEDIAL SITE OPTIMIZATION REPORT

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in **Appendix G.** 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 project manager and the NYSDOH project manager.

8.0 REFERENCES

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC DER-10 – “Technical Guidance for Site Investigation and Remediation”.

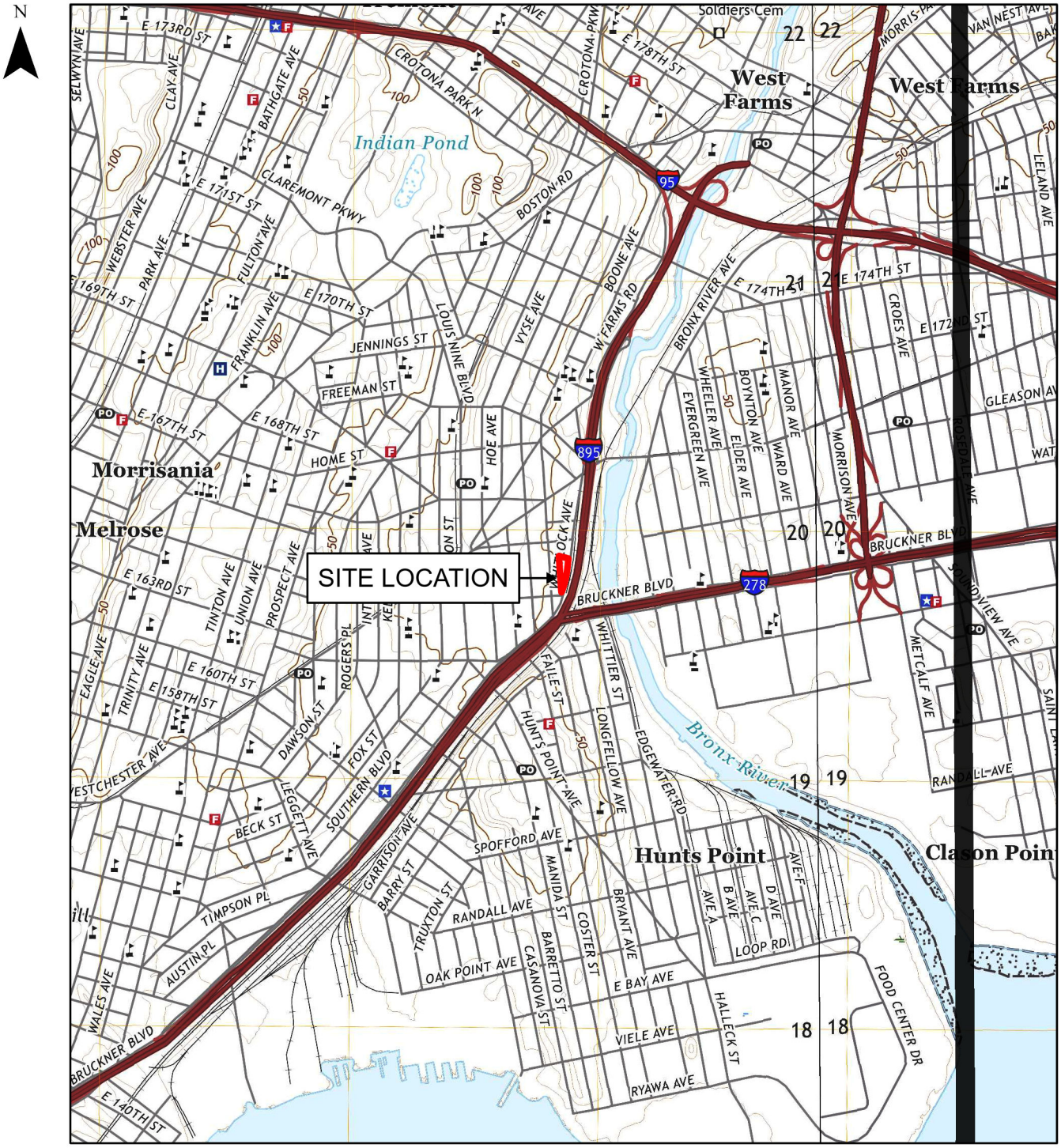
NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

Remedial Investigation Report, Sonero Metro City Auto Site, prepared by SESI, April 2021.

Supplemental Remedial Investigation Report, Sonero Metro City Auto Site, prepared by SESI, May 2022.

Remedial Action Work Plan, Sonero Metro City Auto Site, prepared by SESI, May 2022, Revised March 2023.

Figures



REFERENCE:
UNITED STATES GEOLOGICAL SURVEY (USGS)
CENTRAL PARK, NY USGS QUADRANGLE - 2019

LEGEND:
SITE LOCATION

SCALE: 1" = 2,000'
0 1,000 2,000 4,000 FEET

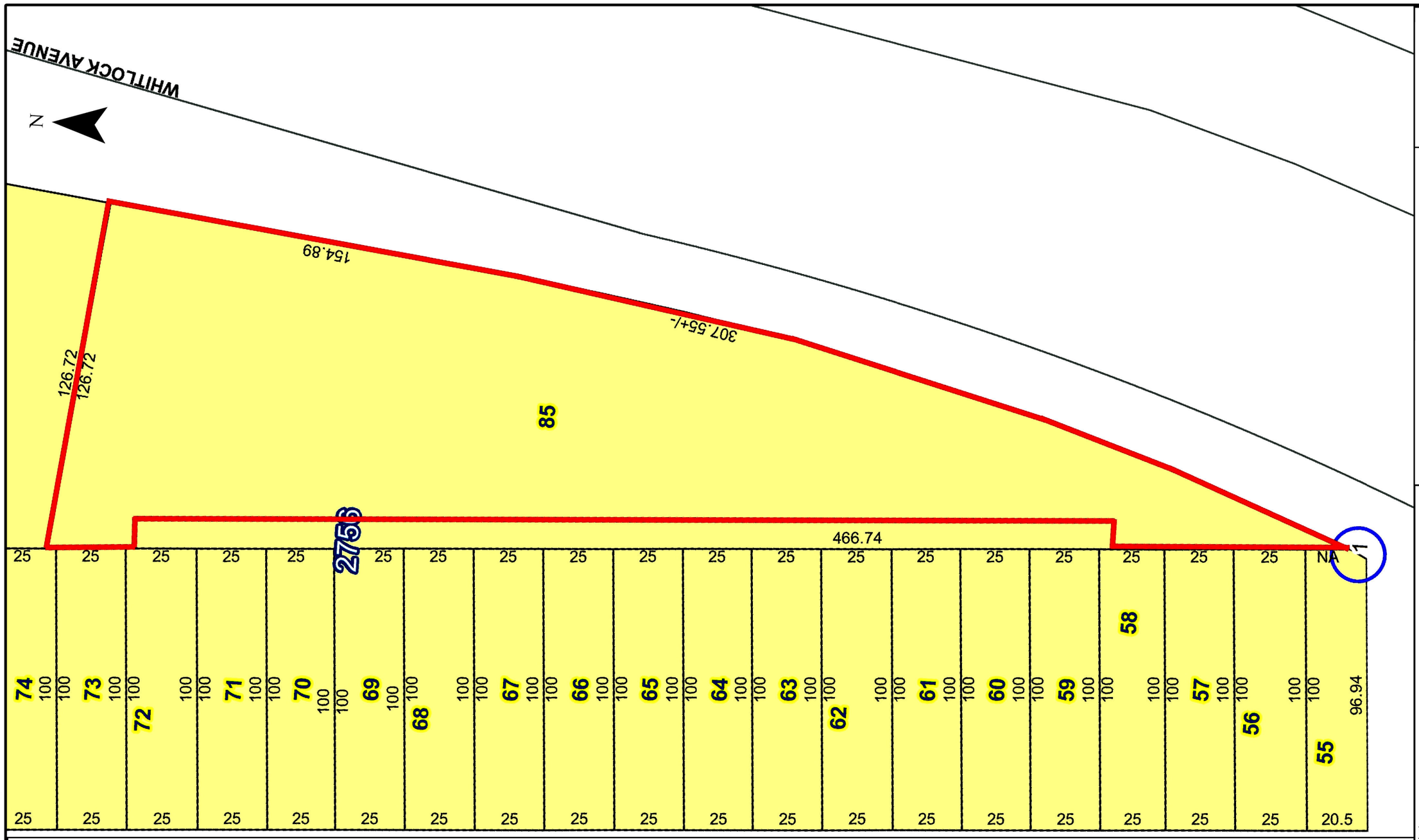
BLOCK 2756, LOT 85
1001 WHITLOCK AVENUE
BRONX, NY 10459

SITE LOCATION MAP

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FIG-1.1	
DRAWN BY:	KBV
CHECKED BY:	CM
SCALE:	AS NOTED
DATE:	10/9/2023
JOB NO:	11819

Y:\GIS\Project_Numbers\11819\FINAL_MAPS, 10/9/2023 10:00 AM, Kim Vanderklein, LAYOUT: FIG-1.1



REFERENCE:

EXISTING CONDITIONS AND BOUNDARY TAKEN FROM "NYC DIGITAL TAX MAP", PREPARED BY NYC DEPARTMENT OF FINANCE, EFFECTIVE AS OF 11/01/2022

LEGEND:

- BCP BOUNDARY
- TAX PARCELS

SCALE: 1" = 35'

0 17.5 35 70 FEET

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

dwg by: KBV
chk by: CM
scale: AS NOTED
date: 10/18/2023

project: BLOCK 2756, LOT 85
1001 WHITLOCK AVENUE
BRONX, NY 10459

title: TAX MAP

job no.: 11819
drawing no: FIG-1.2

Y:\GIS\Project_Numbers\11819\FINAL_MAPS, 10/18/2023 10:30 AM, Kim Vanderklein, LAYOUT: FIG-1.2

REFERENCE:

AERIAL PHOTOGRAPHY,
NEW YORK STATE, MAXAR

LEGEND:

- BCP BOUNDARY
- PARCEL 1
- PARCEL 2 (OFF-SITE)

SCALE: 1" = 100'

0 50 100 200 FEET

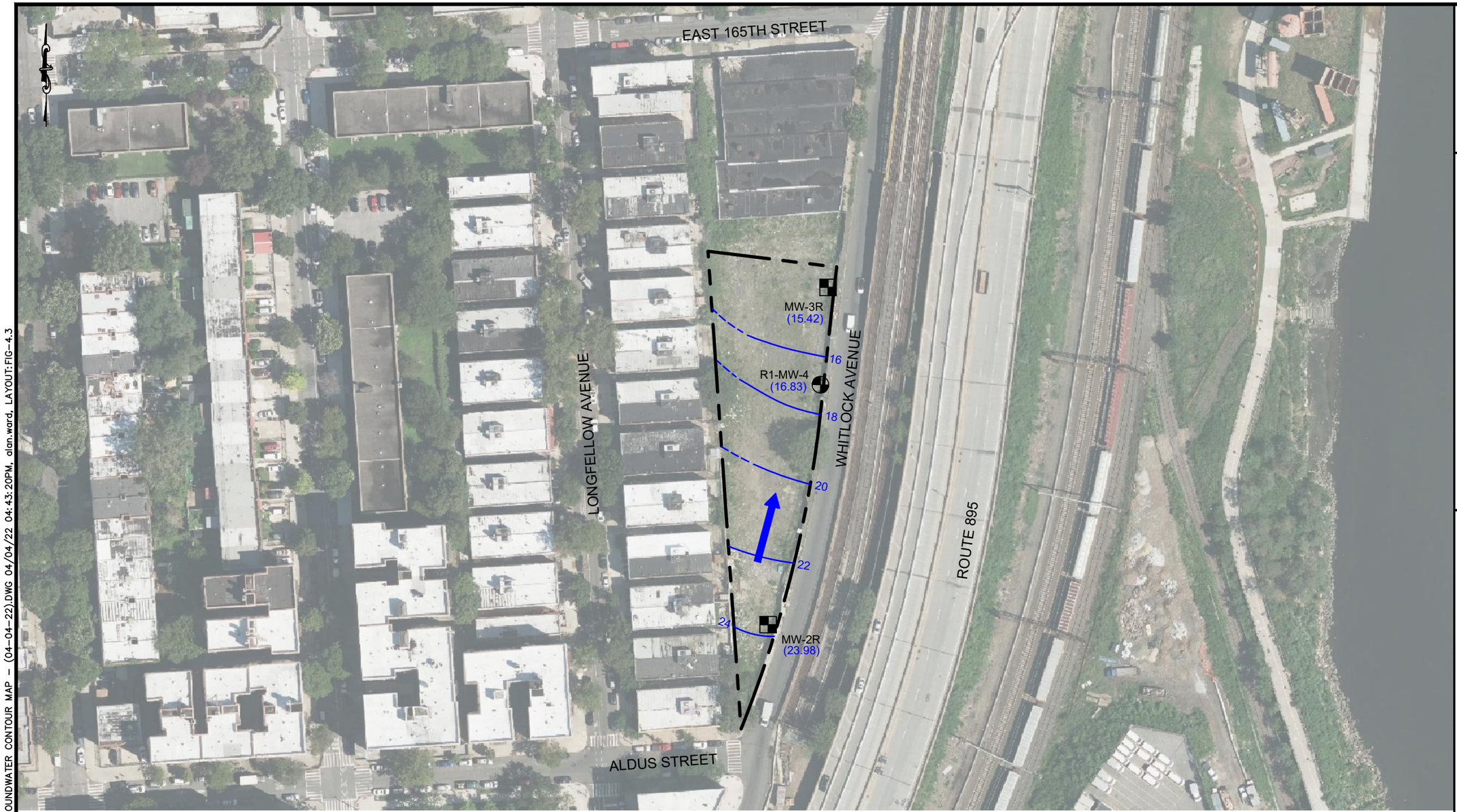
BLOCK 2756, LOT 85
1001 WHITLOCK AVENUE
BRONX, NY 10459

SITE PLAN

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FIG-1.3	
DRAWN BY:	KBV
CHECKED BY:	CM
SCALE:	AS NOTED
DATE:	10/17/2023
JOB NO:	11819

Y:\GIS\Project_Numbers\11819\FINAL_MAPS, 10/17/2023 9:51 AM, Kim Vanderklein, LAYOUT: FIG-1.3



NOTE:
THIS PLAN IS FOR LOCATING MONITORING WELLS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
1. ALL INFORMATION TAKEN FROM GOOGLE EARTH AERIAL, DATED 1/24/2021.
2. GEOD CORPORATION SURVEY LOCATIONS, DATED 3/16/2022.

LEGEND:
- SITE AND PROPERTY BOUNDARY
- RI-MW-4 - MONITORING WELL NUMBER & APPROX. LOCATION
- GROUNDWATER ELEVATION CONTOUR (FEET AMSL) (DASHED WHERE INFERRED)
- (20.83) - GROUNDWATER ELEVATION (FEET AMSL)
- GROUNDWATER FLOW DIRECTION

Scale 1"=100'
0 100 200

SESI CONSULTING ENGINEERS
SOILS / FOUNDATIONS
SITE DESIGN
ENVIRONMENTAL
12A MAPLE AVE. PINE BROOK, N.J. 07058 PH: 973-808-9050

dwg by: aas
chk by: SSG
scale: AS NOTED
date: 03/23/2022

project: 1001 WHITLOCK AVENUE BRONX, NEW YORK 10459

title: GROUNDWATER CONTOUR MAP

job no: 11819
drawing no:

FIG-2.1

N:\ACAD\11819\CAD\11819 — FIG-4.3 — GROUNDWATER CONTOUR MAP — (04-04-22).DWG 04/04/22 04:43:20PM, alan.ward, LAYOUT:FIG-4.3

N

Parent ID:	EP-10-2
Sample ID:	EP-10-2 (5-5.5 Ft)
Sampling Date:	7/25/2023
Sample Depth (ft):	5.0-5.5
Compound	Result
Metals (mg/Kg)	
Lead	164
Mercury	0.296
Zinc	191

Parent ID:	EP-10-1
Sample ID:	EP-10-1 (5-5.5 Ft)
Sampling Date:	7/25/2023
Sample Depth (ft):	5.0-5.5
Compound	Result
Metals (mg/Kg)	
Copper	54.900
Lead	242
Mercury	0.251
Zinc	184

Analyte	NYSDEC USCOs	NYSDEC RSCOs
Metals (mg/Kg)		
Copper	50	280
Lead	63	400
Mercury	0.18	0.26
Zinc	109	1,300

NYSDEC = New York State Department of Environmental Conservation

USCO = Part 375 Unrestricted Soil Cleanup Objectives

RSCO = Part 375 Residential Soil Cleanup Objectives

NT=Not Tested

Exceeds the NYSDEC USCOs
Exceeds the NYSDEC RSCOs

PARCEL 2
AREA = 2458.16 SQFT
OFF-SITE

PARCEL 1
AREA = 1673.99 SQFT
TRACK 2 CLEANUP COMPLETED

TRACK 1 CLEANUP COMPLETED

TAX LOT No.85
AREA=34334.6 SQ.F.

TAX LOT No.55 · TAX LOT No.60 No.1014 · TAX LOT No.61 No.1016 · TAX LOT No.62 No.1020 · TAX LOT No.63 No.1022 · TAX LOT No.64 No.1024 · TAX LOT No.65 No.1026 · TAX LOT No.66 No.1030 · TAX LOT No.67 No.1032 · TAX LOT No.68 No.1034 · TAX LOT No.69 No.1036 · TAX LOT No.70 No.1040 · TAX LOT No.71 No.1042 · TAX LOT No.72 No.1044 · TAX LOT No.73 No.1046 · TAX LOT No.74

IRR. STONE RET. WALL

488.74'

154.89'

126.72'

79°24'10.3"

R = 1330.00'

L = 307.55'

12" WATER MAIN

132" x 117" COMBINED SEWER (APPROX. LOCATION)

ASPHALT CONCRETE

TRAIN TRACKS

CITY RECORD NOT FOUND

WHITLOCK AVENUE (80' WIDE)

SHERIDAN EXPWAY

EP-10-2 EL. 38.01'

EP-10-1 EL. 37.68'

EP-1-1 EL. 23.01' · EP-1-2 EL. 23.27' · EP-1-3 EL. 25.97' AT BEDROCK · EP-1-4 EL. 25.12' AT BEDROCK · EP-1-5 EL. 23.27' · EP-2-1 EL. 27.97' · EP-2-2 EL. 28.36' · EP-2-3 EL. 27.04' · EP-2-4 EL. 27.96' · EP-3-1 EL. 32.70' · EP-3-2 EL. 32.42' · EP-3-3 EL. 33.46' · EP-3-4 EL. 34.27' · EP-3-5 EL. 34.21' · EP-3-6 EL. 34.66' · EP-4-1 EL. 26.46' · EP-4-2 EL. 27.29' · EP-4-3 EL. 26.17' · EP-4-4 EL. 26.19' · EP-4-5 EL. 26.34' · EP-5-1 EL. 34.52' · EP-5-2 EL. 32.07' · EP-5-3 EL. 31.86' · EP-5-4 EL. 31.29' · EP-5-5 EL. 31.64' · EP-6-1 EL. 27.92' · EP-6-2 EL. 28.29' · EP-6-3 EL. 28.31' · EP-6-4 EL. 30.47' · EP-7-1 EL. 29.50' AT BEDROCK · EP-7-2 EL. 30.61' AT BEDROCK · EP-7-3 EL. 29.42' AT BEDROCK · EP-7-4 EL. 32.54' · EP-8-1 EL. 29.63' AT BEDROCK · EP-8-2 EL. 30.39' AT BEDROCK · EP-8-3 EL. 30.83' AT BEDROCK · EP-8-4 EL. 30.00' AT BEDROCK · EP-9-1 EL. 32.01' · EP-9-2 EL. 32.37' · EP-9-3 EL. 30.90'

LEGEND:

- EP-10-1 / EP-1-3 — ENDPOINT SURVEY LOCATIONS / AT BEDROCK
- PARCEL 1
- PARCEL 2 (OFF-SITE)
- BCP BOUNDARY

FOR BEDROCK SAMPLES REFER TABLE 4.6 AND TABLE 4.7

REFERENCE:

SITE LOCATION AND BOUNDARY TAKEN FROM "AREA LOCATION" SURVEY PREPARED STATEWIDE LAND SURVEYING P.C., DATED SEPT 11, 2023
ENDPOINT SURVEY LOCATIONS TAKEN FROM "LOCATION SURVEY FOR REMEDIATION ENDPOINT", PEPARED BY STATEWIDE LAND SURVEYING P.C., DATED SEPT 11, 2023, REV. SEPT 18, 2023

SCALE: 1" = 40'

0 20 40 80 FEET

STATE OF NEW YORK · FUAD JEBRAN DAHAN · 090531-01 · LICENSED PROFESSIONAL ENGINEER

FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

dwg by: KBV
chk by: CM
scale: AS NOTED
date: 12/14/2023

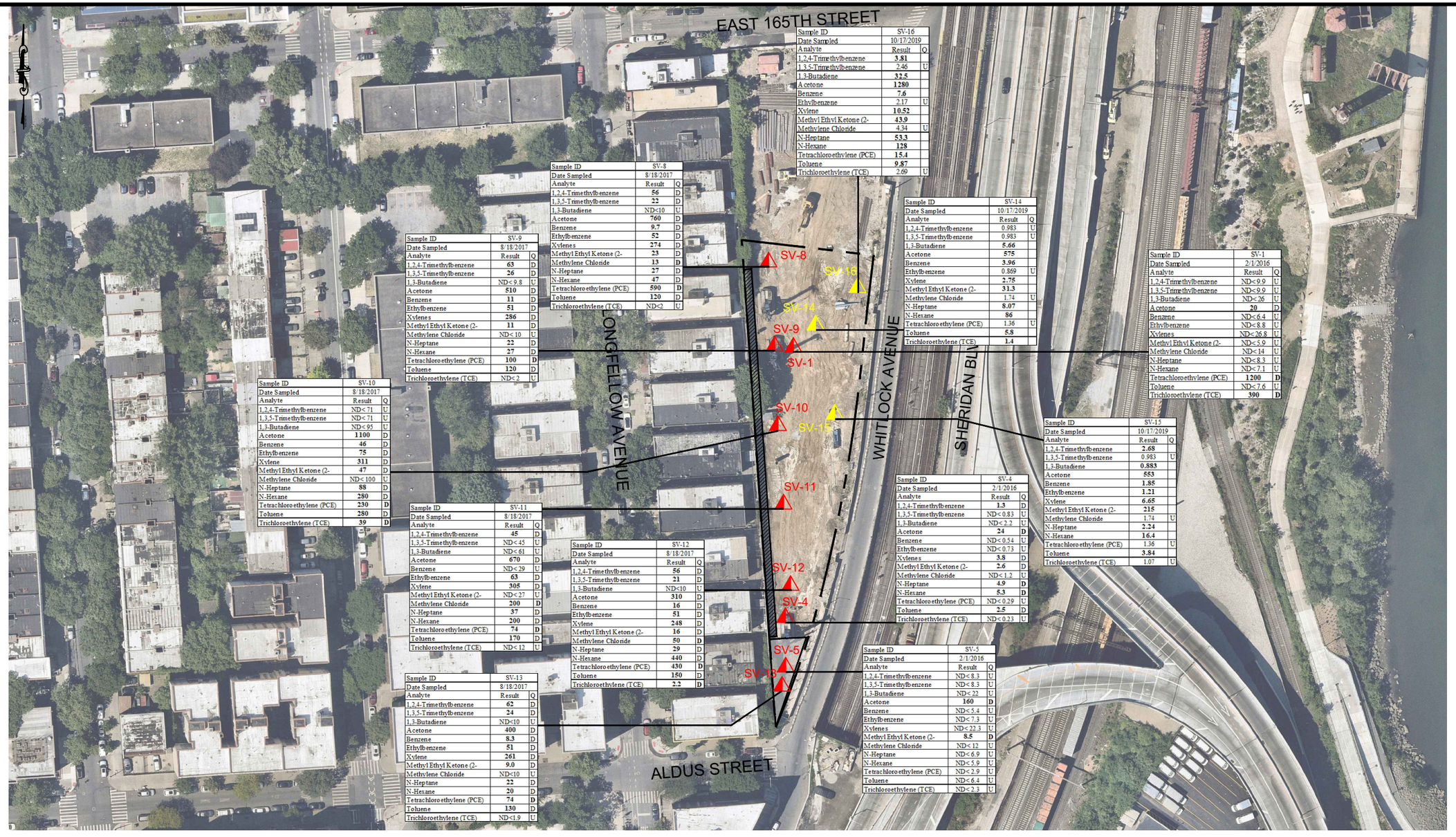
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

project: 1001 WHITLOCK AVENUE BRONX, NEW YORK 10459

title: EXCAVATION AS-BUILT / REMAINING CONTAMINATION FIGURE

job no.: 11819
drawing no: FIG-2.2

Y:\GIS\Project_Numbers\11819\FINAL_MAPS, 12/14/2023 9:14 AM, Kim Vanderklein, LAYOUT: FIG-4.3



Sample ID	SV-16	
Date Sampled	10/17/2019	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**3.81**	
1,3,5-Trimethylbenzene	2.46	U
1,3-Butadiene	**32.5**	
Acetone	**1280**	
Benzene	**7.6**	
Ethylbenzene	2.17	U
Xylene	**10.52**	
Methyl Ethyl Ketone (2-	**43.9**	
Methylene Chloride	4.34	U
N-Heptane	**53.3**	
N-Hexane	**128**	
Tetrachloroethylene (PCE)	**15.4**	
Toluene	**9.87**	
Trichloroethylene (TCE)	2.69	U

Sample ID	SV-8	
Date Sampled	8/18/2017	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**56**	D
1,3,5-Trimethylbenzene	**22**	D
1,3-Butadiene	ND<10	U
Acetone	**760**	D
Benzene	**9.7**	D
Ethylbenzene	**52**	D
Xylenes	**274**	D
Methyl Ethyl Ketone (2-	**23**	D
Methylene Chloride	**13**	D
N-Heptane	**27**	D
N-Hexane	**47**	D
Tetrachloroethylene (PCE)	**590**	D
Toluene	**120**	D
Trichloroethylene (TCE)	ND<2	U

Sample ID	SV-14	
Date Sampled	10/17/2019	
Analyte	Result	Q
1,2,4-Trimethylbenzene	0.983	U
1,3,5-Trimethylbenzene	0.983	U
1,3-Butadiene	**5.66**	
Acetone	**575**	
Benzene	**3.96**	
Ethylbenzene	0.869	U
Xylene	**2.75**	
Methyl Ethyl Ketone (2-	**31.3**	
Methylene Chloride	1.74	U
N-Heptane	**8.07**	
N-Hexane	**86**	
Tetrachloroethylene (PCE)	1.36	U
Toluene	**5.8**	
Trichloroethylene (TCE)	**1.4**	

Sample ID	SV-9	
Date Sampled	8/18/2017	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**63**	D
1,3,5-Trimethylbenzene	**26**	D
1,3-Butadiene	ND<9.8	U
Acetone	**510**	D
Benzene	**11**	D
Ethylbenzene	**51**	D
Xylenes	**286**	D
Methyl Ethyl Ketone (2-	**11**	D
Methylene Chloride	ND<10	U
N-Heptane	**22**	D
N-Hexane	**27**	D
Tetrachloroethylene (PCE)	**100**	D
Toluene	**120**	D
Trichloroethylene (TCE)	ND<2	U

Sample ID	SV-1	
Date Sampled	2/1/2016	
Analyte	Result	Q
1,2,4-Trimethylbenzene	ND<9.9	U
1,3,5-Trimethylbenzene	ND<9.9	U
1,3-Butadiene	ND<26	U
Acetone	**20**	D
Benzene	ND<6.4	U
Ethylbenzene	ND<8.8	U
Xylenes	ND<26.8	U
Methyl Ethyl Ketone (2-	ND<5.9	U
Methylene Chloride	ND<14	U
N-Heptane	ND<8.3	U
N-Hexane	ND<7.1	U
Tetrachloroethylene (PCE)	**1200**	D
Toluene	ND<7.6	U
Trichloroethylene (TCE)	**390**	D

Sample ID	SV-10	
Date Sampled	8/18/2017	
Analyte	Result	Q
1,2,4-Trimethylbenzene	ND<71	U
1,3,5-Trimethylbenzene	ND<71	U
1,3-Butadiene	ND<95	U
Acetone	**1100**	D
Benzene	**46**	D
Ethylbenzene	**75**	D
Xylene	**311**	D
Methyl Ethyl Ketone (2-	**47**	D
Methylene Chloride	ND<100	U
N-Heptane	**88**	D
N-Hexane	**280**	D
Tetrachloroethylene (PCE)	**230**	D
Toluene	**280**	D
Trichloroethylene (TCE)	**39**	D

Sample ID	SV-15	
Date Sampled	10/17/2019	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**2.68**	
1,3,5-Trimethylbenzene	0.983	U
1,3-Butadiene	**0.883**	
Acetone	**553**	
Benzene	**1.85**	
Ethylbenzene	**1.21**	
Xylene	**6.65**	
Methyl Ethyl Ketone (2-	**215**	
Methylene Chloride	1.74	U
N-Heptane	**2.24**	
N-Hexane	**16.4**	
Tetrachloroethylene (PCE)	1.36	U
Toluene	**3.84**	
Trichloroethylene (TCE)	1.07	U

Sample ID	SV-11	
Date Sampled	8/18/2017	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**45**	D
1,3,5-Trimethylbenzene	ND<45	U
1,3-Butadiene	ND<61	U
Acetone	**670**	D
Benzene	ND<29	U
Ethylbenzene	**63**	D
Xylene	**305**	D
Methyl Ethyl Ketone (2-	ND<27	U
Methylene Chloride	**200**	D
N-Heptane	**37**	D
N-Hexane	**200**	D
Tetrachloroethylene (PCE)	**74**	D
Toluene	**170**	D
Trichloroethylene (TCE)	ND<12	U

Sample ID	SV-12	
Date Sampled	8/18/2017	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**56**	D
1,3,5-Trimethylbenzene	**21**	D
1,3-Butadiene	ND<10	U
Acetone	**310**	D
Benzene	**16**	D
Ethylbenzene	**51**	D
Xylene	**248**	D
Methyl Ethyl Ketone (2-	**16**	D
Methylene Chloride	**50**	D
N-Heptane	**29**	D
N-Hexane	**440**	D
Tetrachloroethylene (PCE)	**430**	D
Toluene	**150**	D
Trichloroethylene (TCE)	**2.2**	D

Sample ID	SV-4	
Date Sampled	2/1/2016	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**1.3**	D
1,3,5-Trimethylbenzene	ND<0.83	U
1,3-Butadiene	ND<2.2	U
Acetone	**24**	D
Benzene	ND<0.54	U
Ethylbenzene	ND<0.73	U
Xylenes	**3.8**	D
Methyl Ethyl Ketone (2-	**2.6**	D
Methylene Chloride	ND<1.2	U
N-Heptane	**4.9**	D
N-Hexane	**5.3**	D
Tetrachloroethylene (PCE)	ND<0.29	U
Toluene	**2.5**	D
Trichloroethylene (TCE)	ND<0.23	U

Sample ID	SV-13	
Date Sampled	8/18/2017	
Analyte	Result	Q
1,2,4-Trimethylbenzene	**62**	D
1,3,5-Trimethylbenzene	**24**	D
1,3-Butadiene	ND<10	U
Acetone	**400**	D
Benzene	**8.3**	D
Ethylbenzene	**51**	D
Xylene	**261**	D
Methyl Ethyl Ketone (2-	**9.0**	D
Methylene Chloride	ND<10	U
N-Heptane	**22**	D
N-Hexane	**20**	D
Tetrachloroethylene (PCE)	**74**	D
Toluene	**130**	D
Trichloroethylene (TCE)	ND<1.9	U

Sample ID	SV-5	
Date Sampled	2/1/2016	
Analyte	Result	Q
1,2,4-Trimethylbenzene	ND<8.3	U
1,3,5-Trimethylbenzene	ND<8.3	U
1,3-Butadiene	ND<22	U
Acetone	**160**	D
Benzene	ND<5.4	U
Ethylbenzene	ND<7.3	U
Xylenes	ND<22.3	U
Methyl Ethyl Ketone (2-	**8.5**	D
Methylene Chloride	ND<12	U
N-Heptane	ND<6.9	U
N-Hexane	ND<5.9	U
Tetrachloroethylene (PCE)	ND<2.9	U
Toluene	ND<6.4	U
Trichloroethylene (TCE)	ND<2.3	U

LEGEND:

- SITE AND PROPERTY BOUNDARY
- SV-6 - PVE SOIL VAPOR NUMBER & APPROX. LOCATION
- SV-14 - SESI SOIL VAPOR NUMBER & APPROX. LOCATION
- PARCEL 1
- PARCEL 2

REFERENCE:
ALL INFORMATION TAKEN FROM NEARMAP DATED MAY 28, 2023

NOTES:
1. THIS PLAN IS FOR LOCATING VAPOR LOCATIONS ONLY. OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.
2. ALL CONCENTRATIONS ARE IN MICROGRAMS PER CUBIC METER (ug/m^3)
3. J: ESTIMATED CONCENTRATION

Scale 1"=100'
0 100 200

N:\ACAD\11819\CAD\11819 – FIG-4C – RIR SOIL VAPOR SAMPLE LOCATION PLAN & RESULTS.DWG 09/19/23 01:07:34PM, alan.ward, LAYOUT:FIG-4C

dwg by: AS
chk by: JAM
scale: AS NOTED
date: 02/08/2022

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 ROUTE 46E, 3RD FLOOR, PARSIPPANY, NJ 07054 PH: 973.808.9050

project: 1001 WHITLOCK AVENUE BRONX, NEW YORK 10459

title: SOIL VAPOR SAMPLE RESULTS PLAN

job no: 11819
drawing no:

FIG-2.3

REFERENCE:

AERIAL PHOTOGRAPHY,
NEW YORK STATE, MAXAR, MICROSOFT

LEGEND:

- BCP BOUNDARY
- PARCEL 1
- PARCEL 2 (OFF-SITE)

SCALE: 1" = 100'

0 50 100 200 FEET

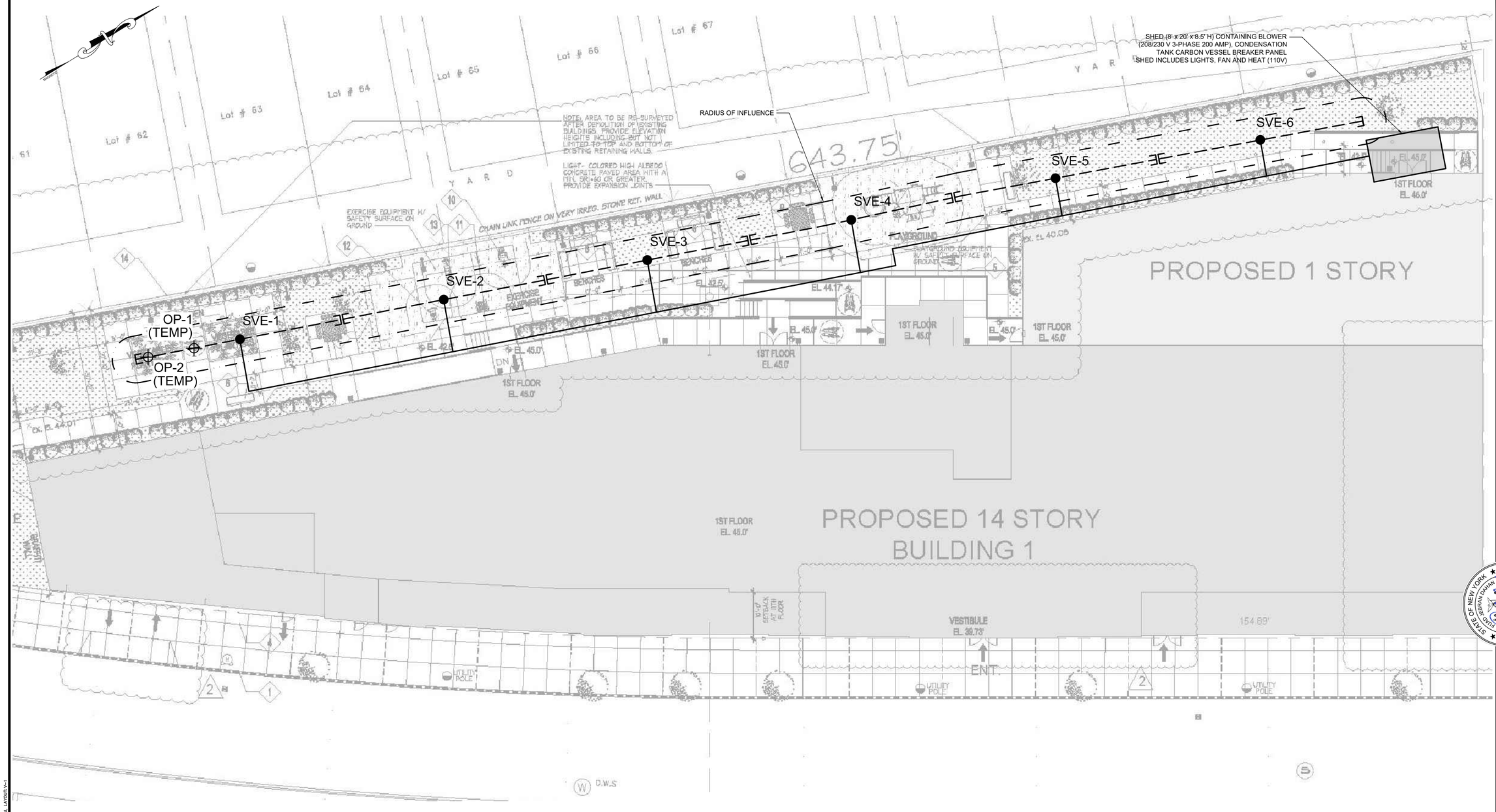
BLOCK 2756, LOT 85
1001 WHITLOCK AVENUE
BRONX, NY 10459

INSTITUTIONAL CONTROL BOUNDARIES

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FIG-3.1	
DRAWN BY:	KBV
CHECKED BY:	CM
SCALE:	AS NOTED
DATE:	10/31/2023
JOB NO:	11819

Y:\GIS\Project_Numbers\11819\FINAL_MAPS, 10/31/2023 9:09 AM, Kim Vanderklein, LAYOUT: FIG-3.1



NOTES:

THE TOTAL LENGTHOF SLOTTED PIPE IS THE SAME AS SOLID PIPE BELOW (267'; CURRENTLY CORRECT). HOWEVER THE SVE POINTS SHOULD BE EVENLY SEPARATED (44.5') AS NOTED APPROXIMATELY, WITH CAPS ON EACH END OF THE SLOTTED PIPING TO THE NORTH AND SOUTH (22.25' IN EACH DIRECTION AT THE MIDPOINTS OF EACH SVE POINT)

REFERENCE:

1. EXISTING CONDITIONS & BOUNDARY ARE TAKEN FROM ARCHITECTURAL SITE PLAN PREPARED BY NEWMAN DESIGN, DATED JULY 14, 2017, REV. 5/6/22

LEGEND:

- SVE-1 ● - SOIL VAPOR EXTRACTION (SVE) POINT LOCATION
- OP-1 (TEMP) ⊕ - TEMPORARY OBSERVATION POINT
- — · · — - RADIUS OF INFLUENCE
- ——— - 4" DIA. SCH 40 SOLID PVC
- — — — - 4" DIA. SCH 40 PVC SCREEN 0.010" WITH GEOTEXTILE FABRIC AROUND
- ⊏ - CAPS FOR 4" PVC

Scale: 1"= 10'

0 5 10 20 30 40

N:\ACAD\11819\CAD\VAPOR\11819ZNC-VAPOR AS-BUILT.DWG 12/14/23 04:18:39PM adam.ward LAYOUT:V-1

rev	date	description	by

dwg by: AW
chk by: FD
scale: AS NOTED
date: 12/5/2023

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
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FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

PROPOSED DEVELOPMENT
1001 WHITLOCK AVENUE
BRONX, BRONX COUNTY, NEW YORK

title: SOIL VAPOR EXTRACTION SYSTEM AS-BUILT PLAN

job no. 11819
drawing no. V-1

GENERAL NOTES

1. THE SOIL VAPOR EXTRACTION (SVE) SYSTEM INCLUDED THE INSTALLATION 6 SVE POINTS THAT CONSIST OF EACH A 7-8' VERTICAL SOLID RISER CONNECTED TO A PERFORATED HORIZONTAL EXTRACTION PIPE THAT EXTENDS PARALLEL THE WESTERN PROPERTY BOUNDARY APPROX. 22.25' TO THE NORTH AND SOUTH OF THE VERTICAL SOLID PVC RISER.

   A. EXTRACTION PIPE – A SEGMENTED 267-FOOT LONG, 4-INCH, HORIZONTAL PERFORATED PIPE SHALL BE INSTALLED AT A DEPTH RANGING FROM 7-8 FEET BELOW GRADE. THE SCREEN SHALL BE 0.010 INCHES. CAPS SHALL BE INSTALLED AT EACH END OF THE 44.50-FEET PERFORATED SEGMENT OF EACH VERTICAL SVE POINT, WITH THE SOLID PVC RISER CONNECTED AT THE MIDPOINT OF EACH SEGMENT. THERE SHALL BE A TOTAL OF 6 SEGMENTS (ONE SEGMENT FOR EACH SVE POINT). EACH SEGMENT OF THE EXTRACTION PIPE SHALL BE COVERED IN A GEOTEXTILE FABRIC AND BE INSTALLED IN A MINIMUM OF 6-INCHES OF GRAVEL/STONE FILL TO EXTRACT ANY VOCS AND PREVENT ANY POSSIBLE OFF-SITE MIGRATION

   B. MANIFOLD HEADER PIPE – 2" SOLID PVC THAT IS DIRECTLY CONNECTED TO THE BLOWER IN THE SHED AND CONNECTS TO EACH SVE POINT.

   C. CONNECTION POINTS – A TOTAL OF SIX(6) CONNECTION POINTS HAVE BEEN INSTALLED TO CONNECT THE EXTRACTION PIPE TO THE HEADER PIPE. EACH CONNECTION POINT INCLUDES A SAMPLE COLLECTION PORT. A GATE VALVE HAS BEEN INSTALLED ON EACH CONNECTION POINT TO BALANCE THE FLOW IN EACH CONNECTION POINT.

   D. SHED – THE SHED WILL HOUSE THE CONDENSATION TANK, BLOWER, GRANULATED ACTIVATED CARBON TOWER AND BREAKER PANEL.

   E. CONDENSATION TANK – THE EXTRACTED SOIL VAPOR WILL FIRST PASS THROUGH A CONDENSATION (KNOCKOUT) TANK.

   F. BLOWER – ATLANTIC BLOWER MODEL AB-900 INDUCED VACUUM ACROSS THE SYSTEM.

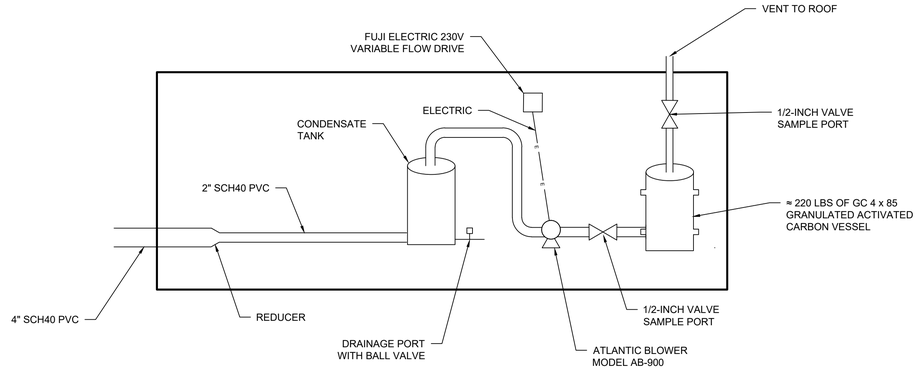
   G. GRANULATED ACTIVATED CARBON (GAC) TOWER – THE VAPOR WILL PASS THROUGH ONE (1) GAC TOWER TO ADSORB ANY VOC.

   H. RISER EXHAUST – THE VAPOR WILL EXIT THE RISER EXHAUST AT THE ROOF LINE OF THE SHED.

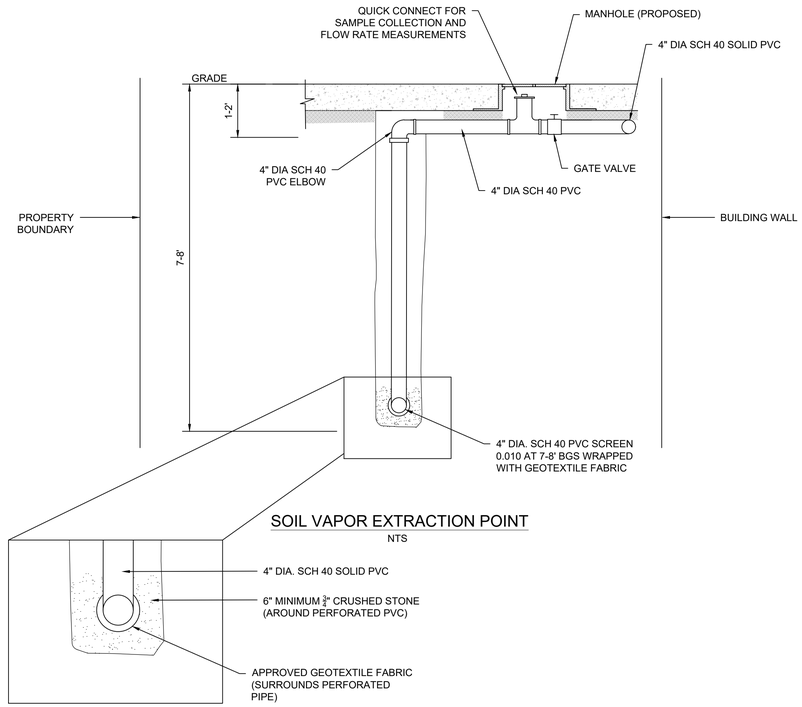
   I. VFD IS ATTACHED TO INTERIOR WALL OF SYSTEM SHED.

   J. RADIUS OF INFLUENCE (ROI) – THE RADIUS OF INFLUENCE IS APPROXIMATELY 5 FEET WITH CENTER POINT AT THE HORIZONTAL WELL.

   K. TEMPORARY OBSERVATION POINTS – TWO (2) TEMPORARY OBSERVATION POINTS WERE INSTALLED 10 FEET AND 20 FEET TO THE SOUTH OF SVE-1, AT 3 FEET ABOVE THE HORIZONTAL WELL, TO EXAMINE THE VACUUM SURROUNDING THE HORIZONTAL WELL.

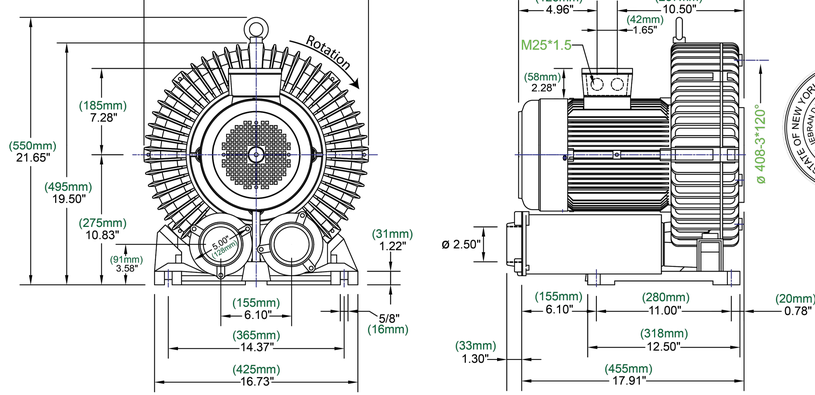


SKETCH OF SYSTEM IN SHED
NTS



SOIL VAPOR EXTRACTION POINT
NTS

2X ENLARGEMENT
NTS



Phase	Model Number	Curve Number	Frequency (Hz)	KW	HP	Max Flow (SCFM)	Max Pressure ("H_2O)	Maximum Vacuum	Sound Level (db)	Inlet Diameter	Voltage	Current (A)	Weight (lbs)
3	AB-900	A22	60Hz	8.60	11.50	399	177	141	80	2.50"	220-275/380-480	37.0Δ/21.3Y	194
			50Hz	7.50	10.00	333	123	98	75		200-240/345-415	30.8Δ/17.8Y	

**Sound db measured at 3 ft.

ATLANTIC BLOWER DETAILS
NTS

N:\VCAD\11819\CAD\VAPOR\11819.DWG VAPOR AS-BUILT.DWG 12/1/23 04:19:43PM, dstin ward, LAYOUT:D-1

rev	date	description	by

dwg by: AW
chk by: FD
scale: AS NOTED
date: 12/5/2023

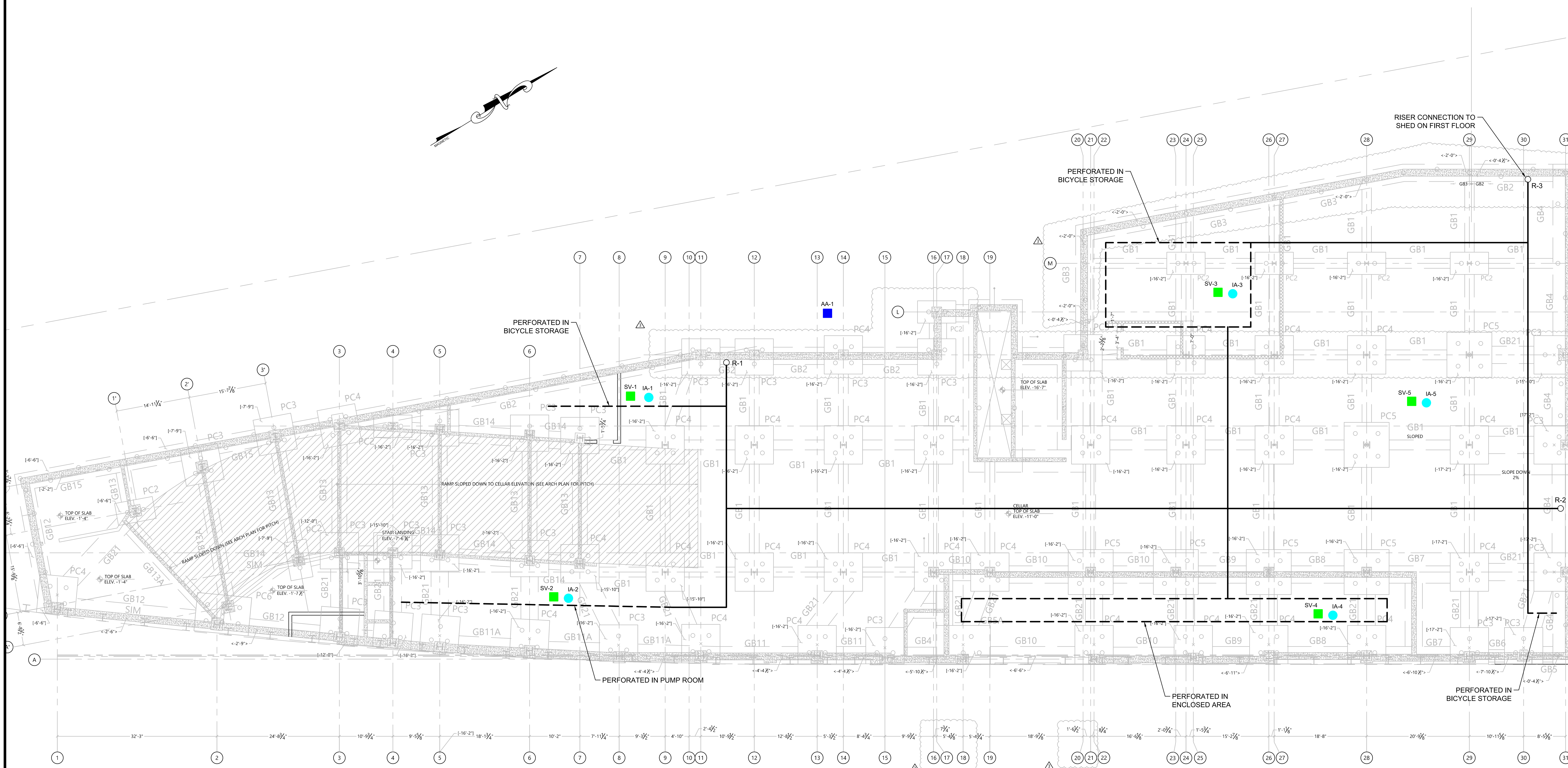
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

PROPOSED DEVELOPMENT
1001 WHITLOCK AVENUE
BRONX, BRONX COUNTY, NEW YORK

title:
SOIL VAPOR EXTRACTION
SYSTEM AS-BUILT DETAILS

job no.: 11819
drawing no.
D-1



LEGEND:

R-1 ○	-	RISER
▬▬▬	-	SOLID PVC
‒ ‒ ‒	-	SLOTTED PVC
SV-2 ■	-	PROPOSED VAPOR POINT LOCATION
IA-2 ●	-	PROPOSED INDOOR AIR SAMPLE LOCATION

NOTE:
THIS PLAN IS FOR LOCATING SOIL VAPOR POINTS ONLY.
OTHER SITE WORK SHOWN HERE IS NOT INTENDED FOR CONSTRUCTION.

REFERENCE:
1. EXISTING CONDITIONS & BOUNDARY ARE TAKEN FROM "FOUNDATION AND LOWER LEVEL PLAN - DWG. NO. S-100" OF 108 SOUTH MAIN STREET, PORT CHESTER, NY. PREPARED BY DESIGN DEVELOPMENT, PLLC., WHITE PLAINS, NY. PERMIT SET DATED 09/09/2022.

N:\ACAD\11819\CAD\VAPOR\11819.DWG.VAPOR AS-BUILT.DWG 09/15/23 04:57:26PM, alan.ward, LAYOUT: V-2

Scale: 1"= 10'
0 5 10 20 30 40

rev	date	description	by

dwg by: AW
chk by: FD
scale: AS NOTED
date: 01/20/2023

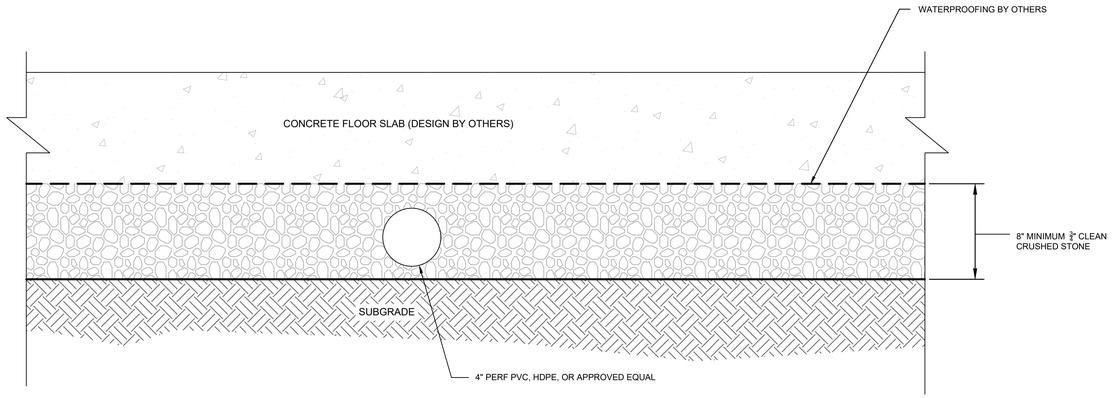
SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

PROPOSED DEVELOPMENT
1001 WHITLOCK AVENUE
BRONX, BRONX COUNTY, NEW YORK

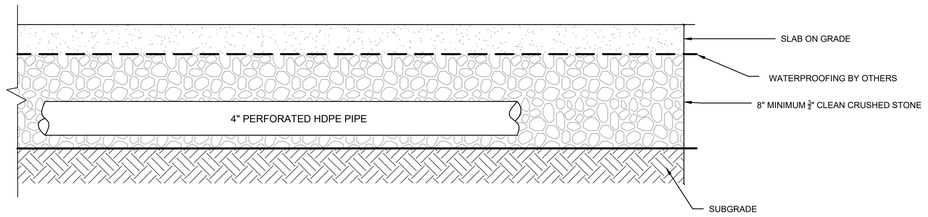
title: SUB-SLAB DEPRESSURIZATION SYSTEM

job no. 11819
drawing no. V-2



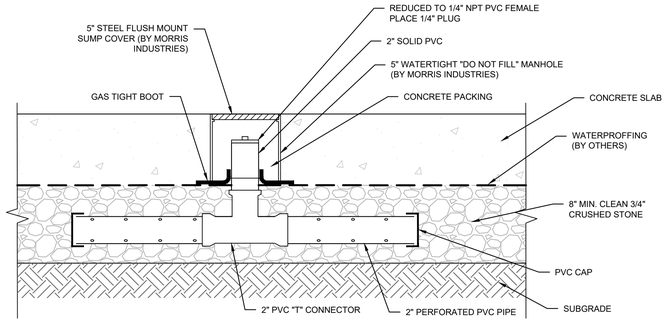
SUBSLAB VENTING LAYER

SCALE: N.T.S.



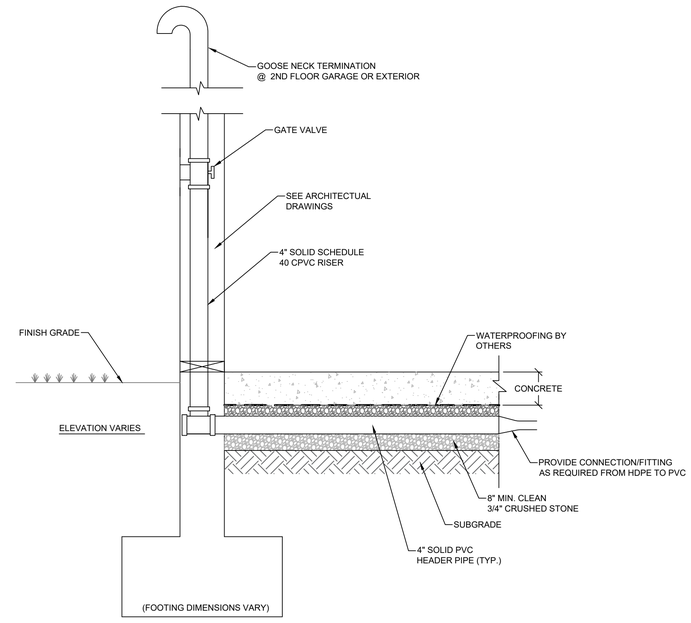
TYPICAL SECTION THROUGH SLAB

SCALE: N.T.S.



TYPICAL SUB-SLAB SAMPLING PORT

SCALE: N.T.S.



VENT RISER ON SECOND FLOOR GARAGE OR EXTERIOR

SCALE: N.T.S.

GENERAL NOTES:

1. THE PLANNED SUB-SLAB VAPOR INTRUSION (VI) MITIGATION SYSTEM WILL BE PLACED BENEATH THE CONCRETE SLAB IN THE ENCLOSED AREAS AS NOTED IN THE V1. THE VI MITIGATION SYSTEM INCLUDES THE FOLLOWING ELEMENTS:
   a) GRAVEL VENTING LAYER - A MINIMUM, 8-INCH THICK LAYER OF ¾" CLEAN CRUSHED STONE SHALL BE PLACED BELOW THE CONCRETE SLAB.
   b) SUB-SLAB COLLECTION PIPING - A NETWORK OF VENTING PIPES (4-INCH PERFORATED PVC, HDPE, OR APPROVED EQUAL) WILL BE PLACED WITHIN THE GRAVEL VENTING LAYER, 1-2" FROM WATERPROOFING AND COMPACTED SUBGRADE. THE VENTING PIPES WILL BE MANIFOLDED AS SHOWN IN DRAWING V-2.
   c) RISERS - CONVEYANCE RISER PIPES WILL BE INSTALLED FROM THE SUB-SLAB HEADER PIPES TO THE SECOND FLOOR OR EXTERIOR AS SHOWN IN THE DRAWING
   d) R-1 SHOULD BE MANIFOLDED WITH THE EXTERIOR SEABOX TO MAKE THE SYSTEM ACTIVE IF NECESSARY (DRAWING V-2).
2. OPERATION OF THE VAPOR INTRUSION (VI) MITIGATION SYSTEM IS DESIGNED TO BE PASSIVE. ALL VENT RISERS SHALL BE FREE OF OBSTRUCTIONS AND VENT VALVES SHALL BE SET IN A FULLY OPEN POSITION. IF NECESSARY, ADJUSTMENT OF THE VENT VALVES SHALL BE PERFORMED BY A COMPETENT AND RESPONSIBLE AGENT TO ENSURE ADEQUATE VENTING OF THE SUB-SLAB SPACE.
3. ALL SUB-SLAB COLLECTION LATERALS AND VERTICAL VENT RISERS SHALL BE FREE OF OBSTRUCTIONS, NOT INUNDATED WITH WATER, AND ABLE TO VENT AIR FREELY FROM BELOW THE BUILDING SLAB TO THE ATMOSPHERE.
4. THE CONTRACTOR SHALL COORDINATE INSTALLATION OF VI MITIGATION SYSTEM WITH OTHER TRADES.
5. ARCHITECTURAL AND ENGINEERING CONSTRUCTION DOCUMENTS HAVE BEEN COORDINATED WITH THESE DRAWINGS. THE GENERAL CONTRACTOR SHALL NOT DEVIATE FROM THESE DOCUMENTS WITHOUT APPROVAL FROM THE RESPECTIVE DESIGN PROFESSIONALS.

N:\VCAD\11819\CAD\VAPOR\11819DWG\VAPOR AS-BUILT.DWG 09/15/23 04:59:12PM -dan ward, LAYOUT1-2

rev	date	description	by

dwg by: AW
chk by: FD
scale: AS NOTED
date: 01/20/2023

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

PROPOSED DEVELOPMENT
1001 WHITLOCK AVENUE
BRONX, BRONX COUNTY, NEW YORK

title: VAPOR MITIGATION AS-BUILT DETAILS

job no. 11819
drawing no. D-2

±

Appendix A:

Environmental Easement/Notice/Deed Restriction

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2023120500384001003EA3CF

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 14**

Document ID: 2023120500384001 Document Date: 11-17-2023 Preparation Date: 12-06-2023
Document Type: EASEMENT
Document Page Count: 12

PRESENTER:
ATLANTIC TITLE AGENCY II, LLC
31 STEWART STREET
ATLC-23-849
FLORAL PARK, NY 11001
516-358-0505
ATLANTICTITLEAGENCY@GMAIL.COM

RETURN TO:
KNAUF SHAW LLP
2600 INNOVATION SQUARE
100 SOUTH CLINTON AVENUE
ROCHESTER, NY 14604

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BRONX	2756	85	Partial Lot	1001 WHITLOCK AVENUE

Property Type: COMMERCIAL REAL ESTATE

CROSS REFERENCE DATA

CRFN_____ *or* DocumentID_____ *or* _____ Year_____ Reel____ Page_____ *or* File Number_____

PARTIES

GRANTOR/SELLER:
HP WHITLOCK HOUSING DEVELOPMENT FUND CO, INC.
253 WEST 35TH STREET, 3RD FLOOR
NEW YORK, NY 10001

☒ Additional Parties Listed on Continuation Page

GRANTEE/BUYER:
NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY
ALBANY, NY 12233-1500

FEES AND TAXES

Mortgage :		
Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	97.00
Affidavit Fee:	$	0.00

Filing Fee:	$	0.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 12-06-2023 12:39
City Register File No.(CRFN): **2023000319313**

City Register Official Signature

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2023120500384001003CA14F

RECORDING AND ENDORSEMENT COVER PAGE (CONTINUATION)

Document ID: 2023120500384001 Document Date: 11-17-2023 Preparation Date: 12-06-2023
Document Type: EASEMENT

PARTIES

GRANTOR/SELLER:
WHITLOCK POINT LLC
5959 BROADWAY, SUITE 3
BRONX, NY 10463

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

THIS INDENTURE made AS OF this 17th day of November, 2023 between Owner(s), HP Whitlock Housing Development Fund Company, Inc., (the "Grantor Fee Owner") having an office at c/o Housing Partnership Development Corporation, 253 West 35th Street, 3rd Floor, New York, New York 10001, County of New York, State of New York, and Whitlock Point LLC, (the "Grantor Beneficial Owner), having an office at 5959 Broadway, Suite 3, Bronx, New York 10463, County of Bronx, State of New York (collectively, 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 Fee Owner, is the owner of the fee interest in the real property located at the address of 1001 Whitlock Avenue in the City of New York, County of Bronx and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 2756 Lot 85, being the same as that property conveyed to Grantor by deed dated June 15, 2017 and recorded in the City Register of the City of New York as CRFN # 2017000237639. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.731 +/- acres, and is hereinafter more fully described in the Land Title Survey dated September 19, 2023 prepared by Vincent M. Teutonico of Statewide Land Surveying 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, Grantor Beneficial Owner, is the owner of the beneficial interest in the Controlled Property being the same as a portion of that beneficial interest conveyed to Grantor Beneficial Owner by means of an Amended and Restated Declaration of Interest and Nominee Agreement dated August 31, 2020 and recorded in City Register of the City of New York as CRFN # 20200002569765; 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: C203148-09-21, as amended by Amendment #1 on August 2, 2023, and by Amendment #2 on October 26, 2023, 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 New York City Department of Health and Mental Hygiene 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: C203148
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 Fee Owner has caused this instrument to be signed in its name.

HP Whitlock Housing Development Fund Company, Inc.:

By: Jamie Atmarr

Print Name: Jamie A. Smarr

Title: President Date: 11/6/23

Grantor's Acknowledgment

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

On the 6th day of November, in the year 2023, before me, the undersigned, personally appeared Jamie A. Smarr, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his 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

MILEIKA BETHANCOURT
Notary Public, State of New York
No. 01BE6220876
Qualified in Kings County
Commission Expires April 19, 2024

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

Whitlock Point LLC:

By: _____

Print Name: Mark Stagg Managing Member

Title: managing member Date: 10/27/2023

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF Westchester

On the 27 day of October, in the year 2023, before me, the undersigned, personally appeared Mark Stagg, 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.

_____
Notary Public - State of New York

KATHLEEN R BRADSHAW
NOTARY PUBLIC-STATE OF NEW YORK
No. 01BR6419928
Qualified in Westchester County
My Commission Expires 01-18-2026

KATHLEEN R BRADSHAW
NOTARY PUBLIC-STATE OF NEW YORK
No. 01BR6419928
Qualified in Westchester County
My Commission Expires 01-18-2026

KATHLEEN R BRADSHAW
NOTARY PUBLIC-STATE OF NEW YORK
No. 01BR6419928
Qualified in Westchester County
My Commission Expires 01-18-2026

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: Andrew Guglielmi
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 17th day of November, in the year 2023 before me, the undersigned, personally appeared Andrew O. Guglielmi, 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.

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

Notary Public - State of New York

SCHEDULE "A" PROPERTY DESCRIPTION

BCP SITE LEGAL DESCRIPTION (PART OF LOT 85)

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of Bronx, City and State New York which property is bounded and described as follows:

BEGINNING at a point on the northwesterly side of Whitlock Avenue distant 203.78 feet southwesterly from the corner formed by the intersection of the northwesterly side of Whitlock Avenue (80 feet wide) and the southerly side of East 165th Street (60 feet wide);

RUNNING THENCE westerly at right angles to Whitlock Avenue, 126.72 feet;

THENCE in a generally southerly direction along a line forming an interior angle of 79 degrees 24 minutes 10.3 seconds with the last mentioned course, 28.30 feet;

THENCE in a general Easterly forming an interior angle of 90 degrees 03 minutes 21 seconds with the last mentioned course, 7.48 feet;

THENCE in a general Southerly direction along a line forming an interior angle of 270 degrees 05 minutes 09 seconds with the last mentioned course, 350.96 feet;

THENCE in a general Westerly forming an interior angle of 269 degrees 51 minutes 29 seconds with the last mentioned course, 6.60 feet;

THENCE in a general Southerly direction along a line forming an interior angle of 90 degrees with the last mentioned course, 87.47 feet;

THENCE along northwesterly and southwester sides of Whitlock Avenue in a general northeasterly direction along a curve having a radius of 1150.00 feet a distance of 307.55 to a point;

THENCE along Westerly side of Whitlock Avenue 154.89 feet to the POINT OR PLACE OF BEGINNING.

Acreage: 0.731 Acre

TRACK 2 AREA LEGAL DESCRIPTION

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York which property is bounded and described as follows:

BEGINNING at a point on the northwesterly side of Whitlock Avenue distant 574.51 feet southwesterly from the corner formed by the intersection of the northwesterly side of Whitlock Avenue (80 feet wide) and the Southerly side of East 165th Street (60 feet wide);

RUNNING THENCE in a general Westerly direction, 21.7 feet;

THENCE in a general Westerly direction along a line forming an interior angle of 175 degrees 30 minutes 55 seconds with the last mentioned course, 15.11 feet;

THENCE in a general southerly direction along a line forming an interior angle of 91 degrees 12 minutes 09 seconds with the last mentioned course, 84.9 feet;

THENCE along northwesterly and southwesterly sides of Whitlock Avenue in a general northeasterly direction along a curve having a radius of 1150.00 feet a distance of 91.71 to the POINT OR PLACE OF BEGINNING.

Acreage: 0.037 Acre

CONDITIONAL TRACK 1 AREA LEGAL DESCRIPTION

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York which property is bounded and described as follows:

BEGINNING at a point on the northwesterly side of Whitlock Avenue distant 203.78 feet southwesterly from the corner formed by the intersection of the northwesterly side of Whitlock Avenue (80 feet wide) and the Southerly side of East 165th Street (60 feet wide);

RUNNING THENCE westerly at right angles to Whitlock Avenue, 126.72 feet;

THENCE in a general southerly direction along a line forming an interior angle of 79 degrees 24 minutes 10.3 seconds with the last mentioned course, 28.30 feet;

THENCE in a general Easterly direction forming an interior angle of 90 degrees 03 minutes 21 seconds with the last mentioned course, 7.48 feet;

THENCE in a general southerly direction along a line forming an interior angle of 270 degrees 05 minutes 09 seconds with the last mentioned course, 350.96 feet;

THENCE in a general Westerly direction forming an interior angle of 269 degrees 51 minutes 29 seconds with the last mentioned course, 6.60 feet;

THENCE in a general southerly direction along a line forming an interior angle of 90 degrees with the last mentioned course, 2.57 feet;

THENCE in a general Easterly direction along a line forming an interior angle of 88 degrees 47 minutes 51 seconds with the last mentioned course, 15.11 feet;

THENCE in a general Easterly direction along a line forming an interior angle of 184 degrees 29 minutes 05 seconds with the last mentioned course, 21.70 feet;

THENCE along northwesterly and southwesterly sides of Whitlock Avenue in a general northeasterly direction along a curve having a radius of 1150.00 feet a distance of 215.84 to a point;

THENCE along Westerly side of Whitlock Avenue 154.89 feet to the POINT OR PLACE OF BEGINNING.

Acreage: 0.694 Acre

±

Appendix B:

List of Site Contacts

Name	Company	Project Role	Email Address	Phone Number
Jay Martino	Whitlock Point, LLC	Site Owner and Remedial Party	JMartino@stagggroup.com	(914) 729-4986
Fuad Dahan, PE	SESI Consulting Engineers, P.C.	Qualified Environmental Professional	fd@sesi.org	(973) 808-9050
Fuad Dahan, PE	SESI Consulting Engineers, P.C.	Remedial Engineer	fd@sesi.org	(973) 808-9050
Michael MacCabe	NYSDEC	Project Manager	michael.maccabe@dec.ny.gov	518-402-9687
Sarah Quandt	NYSDEC	Project Manager's Supervisor	Sarah.quandt@dec.ny.gov	518-402-9116
Kelly Lewandowski	NYSDEC	Site Control	Kelly.lewandowski@dec.ny.gov	518-402-9569
Angela Martin	NYSDOH	Project Manager	angela.martin@health.ny.gov	TBD
TBD	TBD	Site Contact	TBD	TBD
Linda Shaw	Knaupf Shaw LLP	Remedial Party Attorney	lshaw@nyenvlaw.com	585-546-8430

±

Appendix C:

O&M Manual

SESI
CONSULTING ENGINEERS

Geotechnical
Environmental
Site Civil

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Parsippany, NJ 07054
973.808.9050
www.sesi.org

SOIL VAPOR EXTRACTION OPERATION & MAINTENANCE MANUAL

For

Sonero Metro City Auto Site
1001 Whitlock Avenue
Bronx, New York

Prepared for:
Whitlock Point LLC

November 2023

SESI Contact:
Fuad Dahan
fd@sesi.org

SESI Project No:
11819

Table of Contents

FIGURES

APPENDICES

1.0 EXECUTIVE SUMMARY

The following is a description of the soil vapor extraction (SVE) system that has been installed at the former Sonero Metro City Auto Site in Bronx, New York.

SESI has been retained to design, install and operate an SVE system to remove vapor-phase and adsorbed-phase volatile organic compounds (VOCs) from the subsurface at the site. The VOCs are assumed to be from residual contamination from the improper disposal of chemicals used during automotive garage operations. SVE will be implemented along the western site boundary to remove VOCs from the subsurface and prevent off-site migration. VOCs will be physically removed from the soil by applying a vacuum to horizontal wells that have been installed into the vadose zone. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere.

Six (6) segments of manifolded horizontal wells have been installed on the subject property. The maximum air flowrate to be removed from the subsurface will be determined during the SVE system startup. The air flow will be treated using vapor phase activated carbon prior to discharge into the atmosphere.

2.0 INTRODUCTION/CERTIFICATION

2.1 Introduction

This manual discusses the installation, operation and maintenance of the soil vapor extraction (SVE) system at the Sonero Metro City Auto Site in Bronx, New York. SESI installed this system at the request and under the oversight of the New York State Department of Environmental Conservation (NYSDEC). The objective of this Operations and Maintenance Manual is to provide the operations personnel technical information on the equipment comprising the soil vapor extraction system with guidelines on how to operate and maintain it in safe, reliable conditions.

2.2 Professional Engineer Certification

I certify under the penalty of law that this Operation and Maintenance Manual was prepared in accordance with a system designed to assure that the information in this document was properly gathered and evaluated. The information and figures submitted in this manual are, to the best of my knowledge and belief, true, accurate, and complete.

2.3 Plant Design and Overall Operation

A Soil Vapor Extraction (SVE) system has been designed to remediate soil contamination existing at the site. The system was designed using the following criteria:

- Operation of six (6) horizontal vapor extraction wells (4" riser/screen and 4" extraction pipe).
- Gate valves are installed at the connection points of each extraction well to adjust the flow rate.
- All equipment, interconnecting piping and equipment controls mounted or installed within a shed.
- One (1) condensation (knockout) tank has been installed to relieve any moisture from the system.
- Extraction of soil vapors using an SVE blower.
- Off-gas Treatment for vapors consisting of one (1) 55-gallon granular activated carbon (GAC) drum and a discharge stack.

2.3.1 Soil Vapor Extraction

The soil vapor extraction system includes six (6) horizontal vapor extraction wells, constructed of 4-inch schedule-40 PVC with 0.010 slotted screens and placed at 7.5 feet below ground surface (ft-bgs). The horizontal well is wrapped with geotextile fabric and each well contains approximately 44.50 feet of horizontal length with caps on either end, and a total of 267 feet of segmented horizontal well PVC. 8-inch DOT rated manholes were installed at grade to protect the wells. The wells are manifolded to the extraction pipe and fed into the treatment equipment enclosure.

Prior to manifolding each well to the extraction pipe, each 4-inch diameter SVE well header pipe contains a gate valve to control the air flow and vacuum, as well as a sampling port for drawing air samples and conducting flow measurements. The 4-inch piping is manifolded together and connected to a vacuum blower. The blower, motor and other ancillary equipment and

appurtenances are located inside the enclosure (shed) and the variable frequency device (VFD) is mounted on the interior wall to control the flow and terminate the system as needed. Please refer to **Figure V-1 and D-1** for a view of the treatment enclosure, extraction well specifications and piping connections.

Soil gas vapors from the vapor well are drawn through a condensation tank prior to the vacuum blower. Upon high level in the condensation tank, the SVE water will be removed via a valve at the bottom of the condensation tank and disposed of as needed.

2.3.2 Off-Discharge Air Permit

Off-gas treatment system is comprised of one (1) 55-gallon granular activated carbon (GAC) drum. The one (1) filter is arranged in series after the blower and prior to discharge. SESI expects that one (1) GAC tower will be sufficient due to the low levels of VOC contamination.

The discharge stack, constructed of 4-inch Schedule-40 PVC pipe, runs through the roof of the enclosure and off-gasses to the ambient air above the breathing zone.

As-built drawings are provided as attachments to this manual.

3.0 SYSTEM DESCRIPTION

As-built drawings were provided after the initial pilot test, and may be revised after the cap installation. Each major equipment will be described by system specification, startup procedures, normal operation, shutdown procedures, preventative maintenance, repair procedures, spare parts and warrantees/guarantees.

3.1 General Process Equipment Overview

- Six (6) SVE wells;
- SVE Blower for extracting vapor from the extraction wells;
- One (1) GAC Tower to treat the VOCs in the off gas from the SVE blower;
- One (1) Discharge stack;
- One (1) VFD; and
- One (1) enclosure to house the equipment.

3.2 Standard Operating Procedures (SOPs) by Major Equipment

3.2.1 SVE Equipment

The SVE system consists of six (6) SVE wells, one (1) condensation tank and one (1) blower.

SVE system specifications are as follows:

Blower

Manufacturer/Model	Atlantic Blowers
Maximum flow	399 SCFM
Maximum vacuum	141
Maximum pressure	177 “H2O
Motor	11.5 HP
Electric service	3-Phase 220-275V
Materials of construction	Aluminum and Steel

Condensation Tank

Manufacturer/Model	General Carbon
Tank size/holding capacity	55 Gallon
Dimensions	23’ W x 34.5’ H
Materials of construction	Steel

Startup

Prior to operating the blower for the first time, or after long-term shutdown, check the unit and the installation for the following prerequisites that should include:

- Verify that the inlet piping is free of debris.
- Recheck blower leveling, drive alignment and tightness of all mounting bolts.
- Verify that the power to the motor is available and that electrical overload devices are installed and workable and that the safety disconnect switch in the container is "ON".
- The procedure for conducting a trial run of the blower will be provided once the blower specifications have been finalized.

Normal Operation and Controls Description

The blower can be started using the VFD.

Shutdown

The blower can be shut down manually by turning the HOA switch to "OFF" position on the VFD.

Preventive Maintenance

- Periodically check operating conditions and verify that there are no drastic changes.
- If the blower capacity is too great for the vapor extraction air requirements, a small amount of ambient air may be sucked in as make-up air by using the dilution bleed air valve.
- Occasionally stop the blower and clean the temporary inlet protective screen.
- The SVE blower bearings may require replacement as per the manufacturer's recommendations.

Repair Procedures and Spare Parts

Repair procedures and spare parts list for the blower will be provided in the Instructions in **Appendix A-Section I.**

Warranties/Guarantees

The blower will be covered by the manufacturer's warranty.

3.2.2 Off-Gas Equipment

SVE blower discharge is treated through one (1) granular activated carbon drum prior to being discharged into the atmosphere. The one (1) drum is arranged in series after the blower and prior to discharge..

Startup

- Start introducing process air into carbon drum.
- Check the following parameters during the startup to achieve the optimum performance:
  - Air flow rate;
  - Air leaks; and
  - Air temperature.

Normal Operation - Controls Description

During normal operation the off-gas laden with organic compounds is treated in the vapor phase carbon tower prior to discharge into the atmosphere. Monitoring of the carbon influent, mid and effluent air is performed during each weekly site visit (to be modified to bimonthly as needed). VOC concentrations observed at these locations assist in determining the carbon loading rate and in the scheduling of carbon change outs.

Shutdown

The carbon filter have no moving parts. The carbon system is shut down when the SVE system or blower shuts down. Accumulation of significant quantities of condensate in the carbon drum is not anticipated because of the moisture separator that is located on the vacuum side of the SVE blower and the heat of compression of the blower. Any condensate collected from the carbon drum must be containerized on-site pending sampling and appropriate disposal as necessary.

Normal Operation - Carbon Change Out

Periodically the vapor-phase carbon needs to be changed. The frequency of the carbon changeout is determined by the influent and effluent VOC concentrations. When the VOC concentrations in the off-gas from the carbon vessel indicate VOC breakthrough, (effluent is more than 5% of influent (total CVOC and CVOC of concern (PCE, TCE, MC) concentrations)) the carbon drum is to be replaced.

Procedure and Safety Precautions for Carbon Change Out

The following steps may serve as a guideline for replacing the spent carbon drum.

- Shut down SVE system. Lockout/Tagout the SVE system to prevent accidental restart.
- Don appropriate Personal Protective Equipment (PPE), including but not limited to Level D.
- Disconnect the spent carbon drum at both ends and remove it.
- Connect new carbon drum at both ends.
- Seal the drum and label it with appropriate hazardous waste and DOT shipping labels.
- Load spent carbon drum onto transport vehicle with appropriate licenses and permits for shipment to the regeneration/disposal facility.
- Remove lockout/tagout device from SVE system. Restart SVE system utilizing procedures listed above.

Troubleshooting

No troubleshooting is required for the carbon drum.

Repair Information and Spare Parts

None.

Warranties/Guarantees

This will be provided by the manufacturer.

3.2.3 Treatment Enclosure

The equipment associated with soil vapor extraction is housed in an enclosure located in the northwestern portion of the site in accordance with local building and planning codes. The

enclosure is equipped with explosion proof features such as lights, heater with thermostat, blower and motors.

Appropriate safety signs, Health and Safety Plan (HASP), first aid kit, and fire extinguisher are maintained in prominent locations within the enclosure. Treated air is discharged from the carbon filter through a vent stack.

The VFD is installed on the inside of the enclosure.

Heater Fan

A thermostat controlled, explosion proof heater is located within the treatment enclosure.

Repair Procedures and Spare Parts

See manufacturer's specification in **Appendix A**.

Warranties/Guarantees

This will be provided by the manufacturer.

3.2.4 Electrical System

All instrumentation, motor controls, and lighting inside the treatment container is explosion proof. The control panel is installed inside the treatment container. The main disconnect switch is installed in the treatment enclosure. The power feed to the SVE enclosure is from a new 200A, 3 phase, 208/230 volt disconnect switch which connects the VFD to the treatment system enclosure.

4.0 SYSTEM STARTUP AND MONITORING PROCEDURE

4.1 Prerequisites to Startup

The following steps must be followed prior to startup:

- All the equipment must be tested prior to startup according to the manufacturer's instructions.
- The SVE wells, if not preset, must be partially opened.
- All control panels and motors must be connected to power. All HOA switches in ON position.

4.2 Normal Startup

- The normal startup procedure is provided in the manufacturer's owner's manual in **Appendix A**.

4.3 System Shutdown

The system will shutdown automatically upon activation of the condensation tank high level switch.

4.4 Emergency Shutdown

In the event of an emergency, shut down the system by utilizing the main disconnect switch located on VFD. Meet at the designated safety area in the event of shutdown due to power failure, flood, tornado, or other emergency, contingency episodes.

4.5 Routine Operations/Monitoring

Guidelines will be provided by the manufacturer.

5.0 EQUIPMENT MAINTENANCE AND TESTING

5.1 Preventative Maintenance (PM) Program

The SVE equipment, piping and all instrumentation and controls will be monitored on a monthly basis for the first quarter, and quarterly thereafter to prevent the system from shutting down due to leakage, worn out parts or malfunctioning equipment. The program will follow manufacturer's recommended procedures, which are addressed in more detail in **Section 3.0**, System Startup and Shutdown, and individual Manufacturer's O&M Manuals included in **Appendix A**. **Sections 5.3.1 and 5.3.2** address scheduled maintenance for SVE components. **Section 5.3.3** addresses routine maintenance for the Vapor Phase Carbon system including carbon drum changeouts, the frequency of which will be determined by influent and effluent concentrations.

5.2 Device Testing/Preventative Monitoring (PM)

5.2.1 Well Tests

If it becomes apparent during the scheduled operation and maintenance visits that the correct vacuum or pressures cannot be achieved at all SVE wells, the system will be inspected and rebalanced if necessary.

If the vacuum gauge reading demonstrates low values, the SVE piping and well extraction points should be checked for leaks or signs of short circuiting, correct valving positions, and proper operation of the blower. Once the cause of the problem is identified, it will be repaired, and the system returned to normal operation. If the vacuum gauge demonstrates high readings it may indicate that the well screen needs to be cleaned by injecting air, or that something is lodged in the line, or a valve is in the wrong position.

5.2.2 Fans/Blowers/Filters

Prior to system startup, a pilot test will be conducted to determine the blower flow rate needs. Filters will be replaced annually as specified in **Appendix A**.

5.2.3 Carbon Changeout Procedures

Carbon changeout procedures and frequency are addressed in **Section 3.2.2**, Off-Gas Equipment.

5.3 Maintenance Summary Schedule

The maintenance will be recommended for the major SVE equipment by the equipment manufacturer. **Appendix A** will provide more details.

5.3.1 SVE Blowers

- Check all gauges (monthly initially, and then quarterly).
- Check for unusual noise or vibration (monthly initially, and then quarterly).
- Check for any air leaks (monthly initially, and then quarterly).

5.3.2 Other SVE Components

SVE Condensation Tank

SVE condensation tank is a 55-gallon vertical pressure vessel. The tank will be equipped with a high-level switch to monitor liquid level in the tank. Monitoring of the vessel includes occasional visual checks of the level switch to assure proper operation of the moisture separator.

5.3.3 Vapor Phased Activated Carbon

- Replace carbon drums when the VOC effluent concentrations are more than 5% of the influent concentrations for the site-specific contaminants of concern.
- Inspect discharge Piping/Fittings for cracks/leaks.

5.3.4 Ventilation Fan

Periodically clean guards, dampers, motors, and propeller to prevent decrease in airflow or motor overheating. Periodically check for loose bolts and tighten them to prevent excessive vibration.

6.0 SYSTEM MONITORING

The SVE system will be designed to operate continuously. Performance monitoring data showing mass removal rates versus time will be used to evaluate trends for the subject area. The duration of SVE operation will be based on acquired operational data.

6.1 Baseline Startup Monitoring

After the pilot test, the SVE system is now finalized. A baseline startup system monitoring event will be conducted at the Sonero Metro City Auto Site once the concrete/hardscape cover is installed. During that event the SVE system will be activated, routine maintenance tasks will be completed, the controls system will be checked for proper settings and operation, and startup system readings will be taken and recorded.

This data will serve as a baseline for which future system operation and remedial effectiveness can be compared.

6.2 Compliance Monitoring and Samples

The SVE system will be monitored initially on a bi-weekly basis (subject to change as necessary) to evaluate system performance, and to assure that all components are in working order. If performance is satisfactory, the system will then be monitored on a monthly basis for the first quarter of operation, and thereafter may be reduced to quarterly. The general tasks to be performed during each visit are listed in the following paragraph. Notes from the visits should be recorded and kept in the contractor's operating files.

SVE equipment will be inspected and operating parameters (temperature, vacuum readings, air concentration readings, and air flow rates) of the equipment and at individual points will be monitored and adjusted as required. The SVE well points will be monitored and adjusted at each individual extraction point valve. Routine maintenance of the equipment will include the following tasks:

- Draining the moisture knock-out tank by utilizing the one-inch drain located approximately 6 inches from the base of the condensation/knock-out tank,
- Draining any moisture that may have accumulated in the GAC drum.

Meter readings will be recorded every hour to verify duration of the system operation between site visits.

Air effluent volatile organic compound concentrations will be monitored with a PID during each site visit. Air flow rates will be measured and documented. Confirmatory influent and effluent air samples will be collected each month, or quarterly at a minimum, and analyzed by Method TO-15 modified (site specific compounds) to verify field measurements, determine if continued system operation is necessary, and to determine if carbon drum changeout is necessary.

6.3 System Operating Parameters and Process Monitoring

During continuous operation, the expected operating parameters for the SVE system are based on the design calculations, pilot test results, and baseline startup as previously summarized. The final operating flow will be confirmed after baseline startup and balancing tests post COC.

7.0 REPORTING

System performance and all related vapor sampling results will be documented in the Periodic Review Report submitted to the NYSDEC Division of Environmental Remediation.

8.0 HEALTH AND SAFETY

A Site-specific Health and Safety Plan has been developed for the Sonero Metro City Auto Site. A copy of this plan will remain inside the treatment enclosure for reference at all times.

9.0 DISPOSAL/RESIDUALS MANAGEMENT

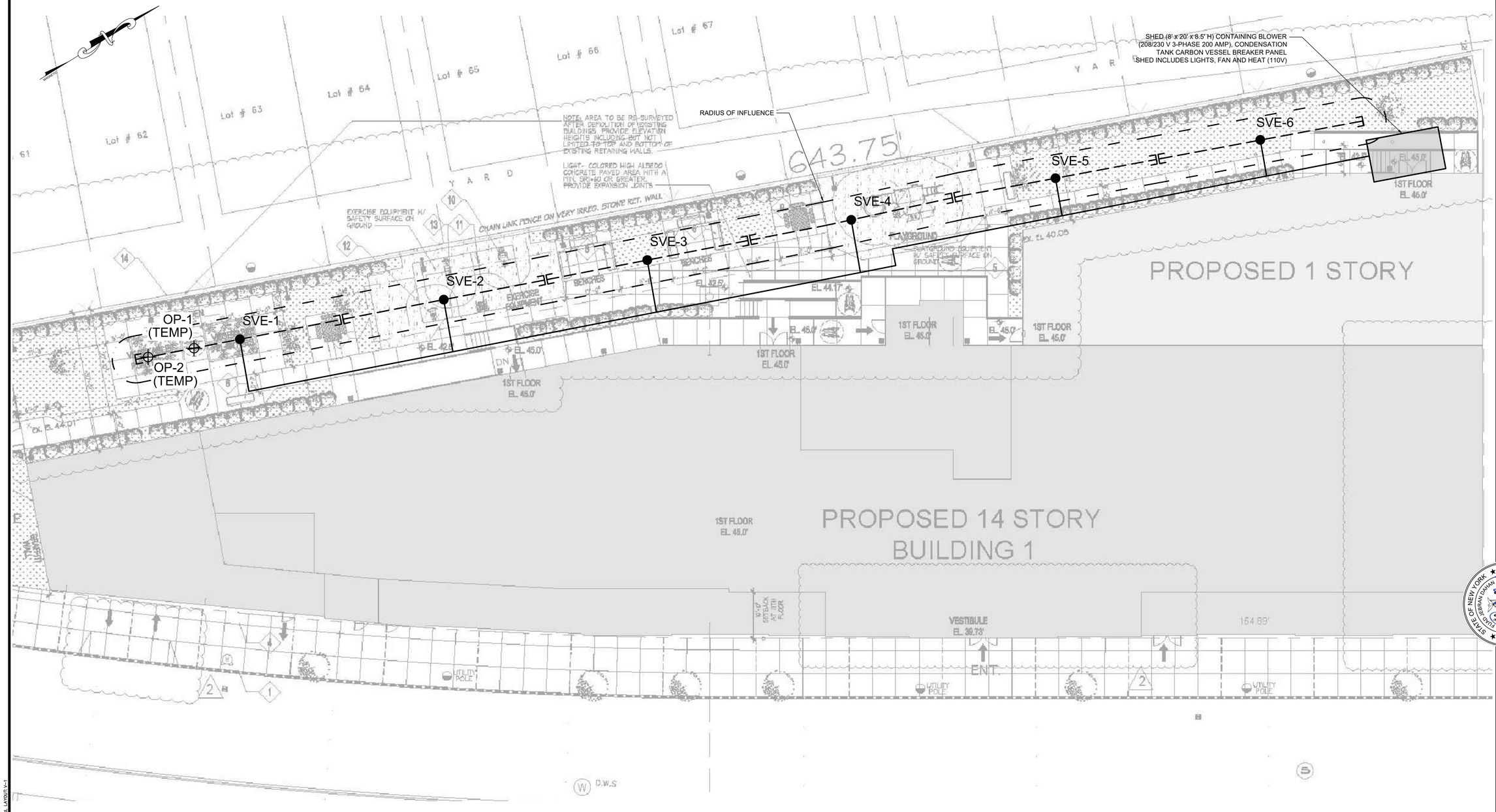
Waters collected from the SVE systems condensation tank will be contained in 55-gallon drums. Once a drum is full, the fluid will be sampled and analyzed to determine proper off-site disposal options. The collected fluid will be disposed of in accordance with all State, Local, and Federal regulations.

Spent carbon drums will be shipped for off-site regeneration or disposed of at a permitted off-site facility. The spent carbon will be regenerated or disposed of in accordance with State, Local, and Federal regulations.

10.0 PROJECT CLOSURE

The SVE system will operate continuously until the VOC removal reaches asymptotic conditions. When asymptotic conditions are reached in accordance with the criteria defined in the SMP, a request will be provided to the NYSDEC and NYSDOH for approval prior to shut down, in accordance with DER-10. After SVE system shut down, demobilization and restoration activities will be performed, and all system operations and related sampling will be reported to the NYSDEC in the Periodic Review Report.

FIGURES



NOTES:

THE TOTAL LENGTHOF SLOTTED PIPE IS THE SAME AS SOLID PIPE BELOW (267'; CURRENTLY CORRECT). HOWEVER THE SVE POINTS SHOULD BE EVENLY SEPARATED (44.5') AS NOTED APPROXIMATELY, WITH CAPS ON EACH END OF THE SLOTTED PIPING TO THE NORTH AND SOUTH (22.25' IN EACH DIRECTION AT THE MIDPOINTS OF EACH SVE POINT)

REFERENCE:

1. EXISTING CONDITIONS & BOUNDARY ARE TAKEN FROM ARCHITECTURAL SITE PLAN PREPARED BY NEWMAN DESIGN, DATED JULY 14, 2017, REV. 5/6/22

LEGEND:

- SVE-1 ● - SOIL VAPOR EXTRACTION (SVE) POINT LOCATION
- OP-1 (TEMP) ⊕ - TEMPORARY OBSERVATION POINT
- — · · — - RADIUS OF INFLUENCE
- ——— - 4" DIA. SCH 40 SOLID PVC
- — — — - 4" DIA. SCH 40 PVC SCREEN 0.010" WITH GEOTEXTILE FABRIC AROUND
- ⊏ - CAPS FOR 4" PVC

Scale: 1"= 10'

0 5 10 20 30 40

N:\ACAD\11819\CAD\VAPOR\11819ZNC-VAPOR AS-BUILT.DWG 12/14/23 04:18:39PM adam.ward LAYOUT:V-1

rev	date	description	by

dwg by: AW
chk by: FD
scale: AS NOTED
date: 12/5/2023

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

PROPOSED DEVELOPMENT
1001 WHITLOCK AVENUE
BRONX, BRONX COUNTY, NEW YORK

title: SOIL VAPOR EXTRACTION SYSTEM AS-BUILT PLAN

job no. 11819
drawing no. V-1

GENERAL NOTES

1. THE SOIL VAPOR EXTRACTION (SVE) SYSTEM INCLUDED THE INSTALLATION 6 SVE POINTS THAT CONSIST OF EACH A 7-8' VERTICAL SOLID RISER CONNECTED TO A PERFORATED HORIZONTAL EXTRACTION PIPE THAT EXTENDS PARALLEL THE WESTERN PROPERTY BOUNDARY APPROX. 22.25' TO THE NORTH AND SOUTH OF THE VERTICAL SOLID PVC RISER.

   A. EXTRACTION PIPE – A SEGMENTED 267-FOOT LONG, 4-INCH, HORIZONTAL PERFORATED PIPE SHALL BE INSTALLED AT A DEPTH RANGING FROM 7-8 FEET BELOW GRADE. THE SCREEN SHALL BE 0.010 INCHES. CAPS SHALL BE INSTALLED AT EACH END OF THE 44.50-FEET PERFORATED SEGMENT OF EACH VERTICAL SVE POINT, WITH THE SOLID PVC RISER CONNECTED AT THE MIDPOINT OF EACH SEGMENT. THERE SHALL BE A TOTAL OF 6 SEGMENTS (ONE SEGMENT FOR EACH SVE POINT). EACH SEGMENT OF THE EXTRACTION PIPE SHALL BE COVERED IN A GEOTEXTILE FABRIC AND BE INSTALLED IN A MINIMUM OF 6-INCHES OF GRAVEL/STONE FILL TO EXTRACT ANY VOCS AND PREVENT ANY POSSIBLE OFF-SITE MIGRATION

   B. MANIFOLD HEADER PIPE – 2" SOLID PVC THAT IS DIRECTLY CONNECTED TO THE BLOWER IN THE SHED AND CONNECTS TO EACH SVE POINT.

   C. CONNECTION POINTS – A TOTAL OF SIX(6) CONNECTION POINTS HAVE BEEN INSTALLED TO CONNECT THE EXTRACTION PIPE TO THE HEADER PIPE. EACH CONNECTION POINT INCLUDES A SAMPLE COLLECTION PORT. A GATE VALVE HAS BEEN INSTALLED ON EACH CONNECTION POINT TO BALANCE THE FLOW IN EACH CONNECTION POINT.

   D. SHED – THE SHED WILL HOUSE THE CONDENSATION TANK, BLOWER, GRANULATED ACTIVATED CARBON TOWER AND BREAKER PANEL.

   E. CONDENSATION TANK – THE EXTRACTED SOIL VAPOR WILL FIRST PASS THROUGH A CONDENSATION (KNOCKOUT) TANK.

   F. BLOWER – ATLANTIC BLOWER MODEL AB-900 INDUCED VACUUM ACROSS THE SYSTEM.

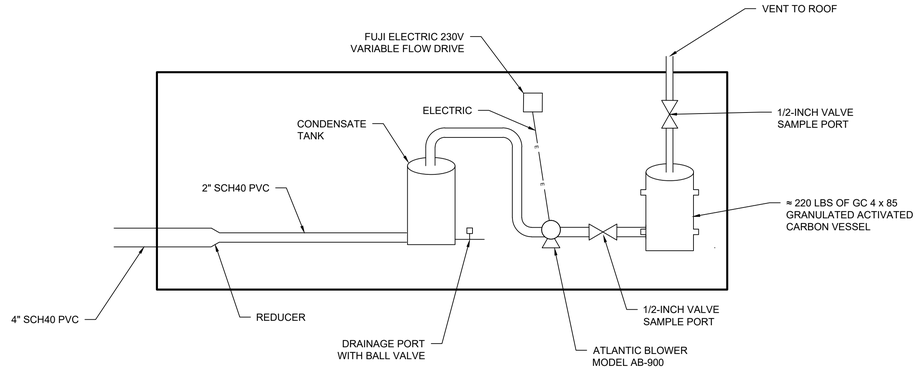
   G. GRANULATED ACTIVATED CARBON (GAC) TOWER – THE VAPOR WILL PASS THROUGH ONE (1) GAC TOWER TO ADSORB ANY VOC.

   H. RISER EXHAUST – THE VAPOR WILL EXIT THE RISER EXHAUST AT THE ROOF LINE OF THE SHED.

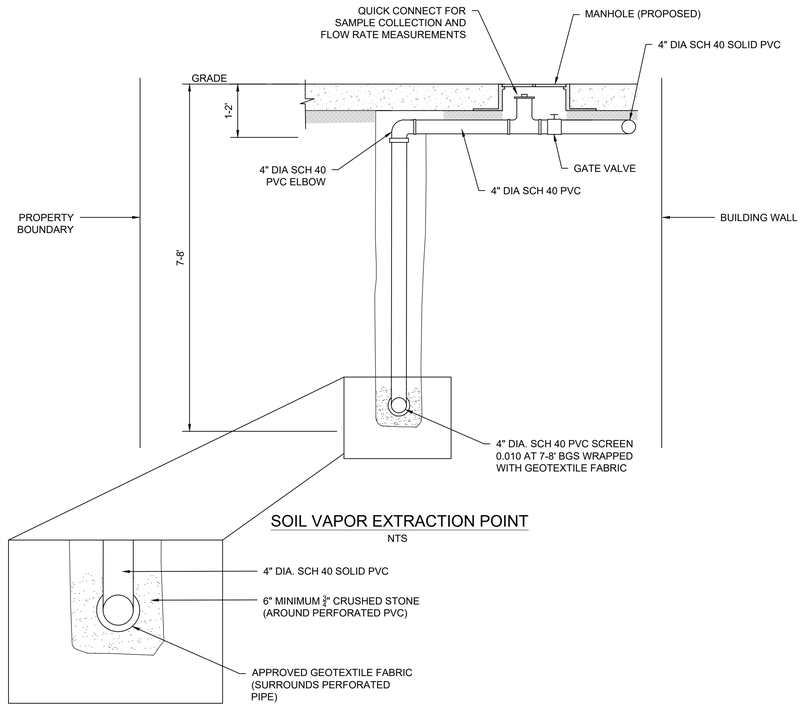
   I. VFD IS ATTACHED TO INTERIOR WALL OF SYSTEM SHED.

   J. RADIUS OF INFLUENCE (ROI) – THE RADIUS OF INFLUENCE IS APPROXIMATELY 5 FEET WITH CENTER POINT AT THE HORIZONTAL WELL.

   K. TEMPORARY OBSERVATION POINTS – TWO (2) TEMPORARY OBSERVATION POINTS WERE INSTALLED 10 FEET AND 20 FEET TO THE SOUTH OF SVE-1, AT 3 FEET ABOVE THE HORIZONTAL WELL, TO EXAMINE THE VACUUM SURROUNDING THE HORIZONTAL WELL.

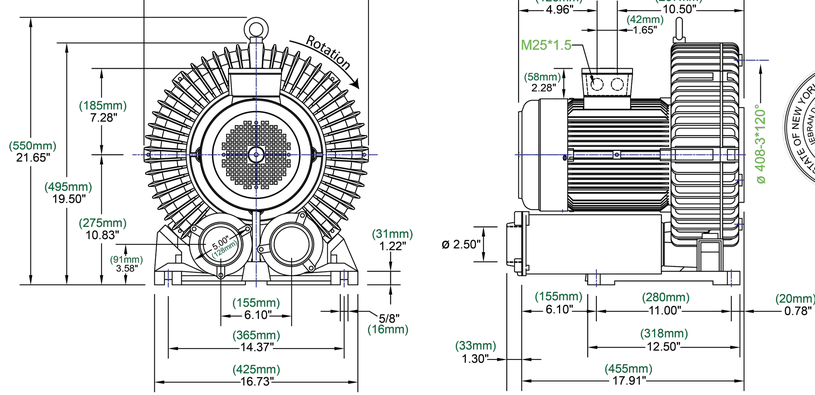


SKETCH OF SYSTEM IN SHED
NTS



SOIL VAPOR EXTRACTION POINT
NTS

2X ENLARGEMENT
NTS



Phase	Model Number	Curve Number	Frequency (Hz)	KW	HP	Max Flow (SCFM)	Max Pressure ("H_2O)	Maximum Vacuum	Sound Level (db)	Inlet Diameter	Voltage	Current (A)	Weight (lbs)
3	AB-900	A22	60Hz	8.60	11.50	399	177	141	80	2.50"	220-275/380-480	37.0Δ/21.3Y	194
			50Hz	7.50	10.00	333	123	98	75		200-240/345-415	30.8Δ/17.8Y	

**Sound db measured at 3 ft.

ATLANTIC BLOWER DETAILS
NTS

N:\VCAD\11819\CAD\VAPOR\11819.DWG VAPOR AS-BUILT.DWG 12/1/23 04:19:43PM, dstin ward, LAYOUT:D-1

rev	date	description	by

dwg by: AW
chk by: FD
scale: AS NOTED
date: 12/5/2023

SESI CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | SITE CIVIL
959 route 46e, 3rd floor, parsippany, nj 07054 ph: 973.808.9050

FUAD DAHAN, P.E.
PROFESSIONAL ENGINEER
N.Y. LIC. NO. 90531

PROPOSED DEVELOPMENT
1001 WHITLOCK AVENUE
BRONX, BRONX COUNTY, NEW YORK

title:
SOIL VAPOR EXTRACTION
SYSTEM AS-BUILT DETAILS

job no.: 11819
drawing no.
D-1

APPENDIX

OWNER'S MANUAL

General Use Criteria

- Use only clean, dry air. If moisture is present please use a liquid separator.
- Do not use flammable, explosive gases or atmosphere that contains such gases with standard motors/blowers. It is required that you consult Atlantic Blowers for explosion proof motors/blowers.
- Ambient temperatures must be between 0°C – 40°C (32° F – 104°F). For higher temperatures please consult factory.
- Protect unit from contaminants and moisture.
- Protect all surrounding items from exhausted air, as it can be very hot. It is strongly recommended that the first 5'-8' of piping be metal.
- Air particles, water vapor, oil based contaminants or other liquids, can be harmful to the blower and may cause over-heating. The use of an air-filter, relief valve, and pressure gauge are highly recommended in conjunction with our blowers.
- When using the blower at a high altitude or high temperatures, please consult with Atlantic Blowers prior to use.

Safety Notice

To ensure safe operation, we have provided many important safety guidelines in this manual for the Atlantic Regenerative Blower. Please read this instruction manual carefully, and pay particular attention to instructions with the following signs:

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury

1 Installation

1-1 Installation

Install the blower on a level, stable operating surface and use vibration isolation pads to reduce noise and vibration.

1. Correct installation is the customer's responsibility.
2. Recommended piping should be, *at minimum,* the same size as the inlet and outlet ports.
3. Elbows increase friction. Minimizing the amount of elbows in the piping run will decrease friction loss.
4. Pressure or relief valves should be installed in a "T" that is at least one (1) pipe size larger than the port diameter.
5. Exhaust air temperature increases significantly above 65" of water column. Discharged air is typically too hot for most plastic piping. Therefore, metal piping is recommended for at least the first five (5´) to eight (8´) feet from the blower on the discharge side. In addition, this piping MUST be guarded and marked "DANGER-HOT-DO NOT TOUCH."
6. Install the blower in a location protected from the elements, or use an enclosure to protect the unit.

1-2 Rotation

From the motor side of the blower, verify the blower is rotating in the direction indicated by the arrow on the motor. (The motor side is marked with an arrow on most models.) Proper rotation can also be checked by the air flow at the inlet and outlet ports. On blowers powered by a 3-phase motor, change the connection of any two (2) wires to reverse blower rotation.

1-3 Plumbing

Remove any foreign material (burrs, chips, welding drops, slag, pipe cuttings, excess sealant, sand, lime, etc.) from plumbing.

Verify the motor is securely mounted and has proper impeller rotation before connecting to plumbing. The inlet and outlet ports are not designed to support the plumbing without proper structural reinforcement. Remove plastic safety plugs from the inlet and outlet ports and connect the plumbing with properly sized fittings.

Use a relief valve to discharge excess air beyond the preset level on pressure applications. Use a vacuum relief valve to draw in excess air when preset vacuum level is achieved. This will greatly reduce the possibility of over-heating.

Install an intake filter to prevent foreign material from entering the blower. In applications where there is high humidity or liquids being used in the process, install a moisture separator with a drain valve.

1-4 Accessories

Install a filter monitor gauge to monitor the pressure/vacuum differential through the filter element. As filters become clogged, performance and efficiency will be reduced. Filters should be checked periodically and replaced when necessary. The recommended check valves provide minimal pressure drop, positive sealing, and are resistant to the high discharge temperatures of the blowers. (Refer to Atlantic Regenerative Blower Check Valves List)

1-5 Motor Control

It is your responsibility to contact a qualified electrician and ensure that the electrical installation is adequate and in compliance with all national and local electrical codes.

Select fuses, motor protective switches, or thermal protective switches to provide desired protection. Fuses act as short circuit protectors for the motor, not as protection against overloading. Incoming line fuses must be able to withstand the motor´s starting current. Motor starters with thermal magnetic overload or circuit breakers protect motor from overload or reduced voltage conditions. Motors without automatic restart require thermal protection, magnetic or over-current cutout to prevent motor overloading from single phasing in a 3-phase circuit, high starting frequency, or locked blower.

1-6 Electrical Connection

- Failure to follow these instructions can result in death, fire or electrical shock.
- Do not modify the plug provided. If it will not fit the outlet, have the proper outlet installed by a qualified/certified electrician.
- If repairing the cord or plug, do not connect the ground wire (green or green with yellow stripes) to either terminal.
- Check the condition of the power supply wires.
- Do not permanently connect this product to wiring that is in poor condition or that is inadequately sized for the requirement of this blower.

- This product must be properly grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current.
- If the grounding instructions are not completely understood, or if you are not sure whether the product is properly grounded, check with a qualified electrician or serviceman.

2 Operation

⚠ WARNING

Injury Hazard

- Failure to follow these instructions can result in burns, eye injury or other serious injury.
- Install proper safety guards as needed to prevent any close contact with blower suction area.
- Keep fingers and objects away from openings and rotating parts.
- Blower surfaces become very hot during operation. Allow these surfaces to cool before handling.
- Wear proper eye protection. Air stream from product may contain solid or liquid material that can result in eye or skin damage.
- Wear hearing protection. Sound level from some models may exceed 81 dBA.
- It is your responsibility to operate this product at recommended pressures or vacuum duties and room ambient temperatures.

Do not throttle discharge or suction pipe to reducer capacity. Throttle will increase differential pressure causing increasing power absorption and working temperatures.

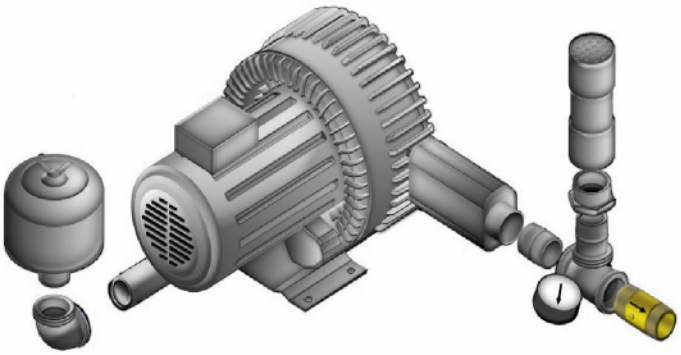
Start Up

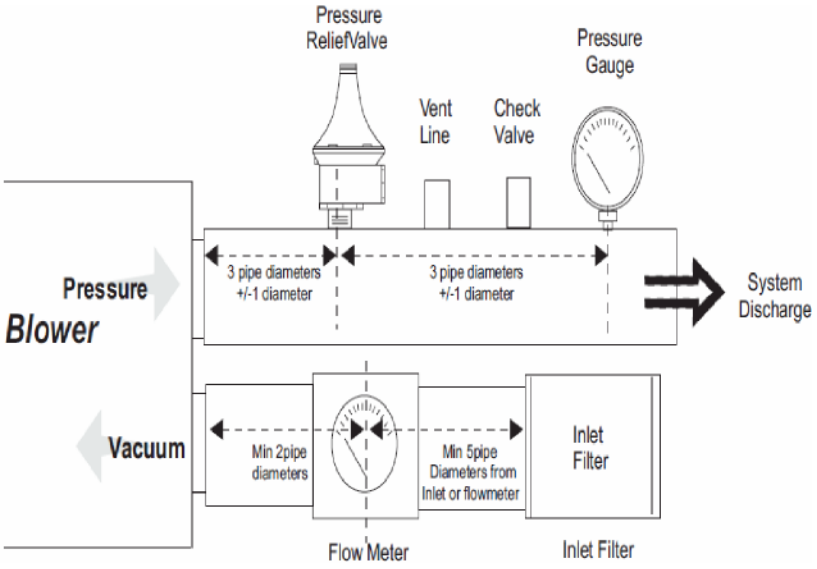
Operate blower for an hour and then check:

1. **Ambient temperature** – Increased room temperatures may require stronger ventilation especially for larger blowers. Room temperature should not exceed 100ºF.
2. **Pressure and vacuum valves** – Adjust relief valve pressure or vacuum setting, if needed.
3. **Motor current** – Check that supply current matches recommended current rating on blower nameplate.
4. **Electrical overload cutout** – Check that current matches rating on blower nameplate.

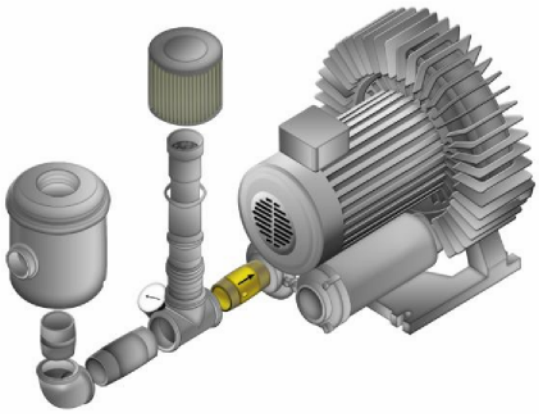
If motor fails to start or slows down significantly under load, shut off and disconnect from power supply immediately. Check that the voltage is correct for the motor and that the motor is turning in the proper direction.

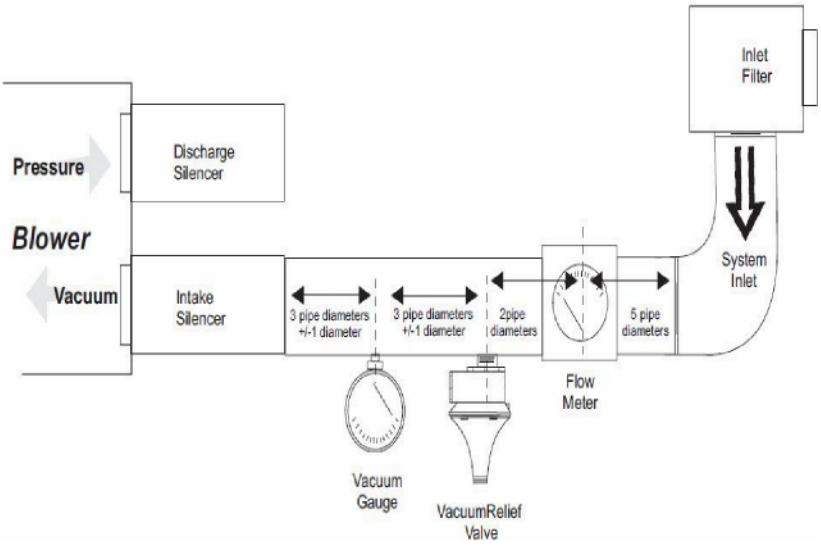
Standard Installation Layout - Pressure Application





Standard Installation Layout - Vacuum Application





3 Maintenance

- Failure to follow these instructions can result in death, fire or electrical shock
- Disconnect electrical power supply cord before performing maintenance on the blower.
- If product is hard wired into system, disconnect electrical power at the circuit breaker or fuse box before performing maintenance on the blower.

⚠ WARNING

Injury Hazard

- Failure to follow these instructions can result in burns, eye injury or other serious injury.
- Blower surfaces become very hot during operation. Allow blower surfaces to cool before handling.
- Wear proper eye protection. Air stream from product may contain solid or liquid material that can result in eye or skin damage.
- It is the customer's responsibility to regularly inspect and make necessary repairs to the blower in order to maintain proper operation. Make sure that the pressure and vacuum are released from the product before beginning any maintenance work.

Preventive Maintenance

- After the first 500 hours of operation, the following items need to be checked: >
  Filter elements
  > Noise absorbing foam used in muffler
  > Clean motor and blower

- Replace filter elements as needed. Mufflers should be checked on a monthly basis.

Bearing Maintenance

To lubricate the bearings, the roller contact bearings and the adjacent bearing housing should have the used grease removed and replaced with fresh grease. About 50% of the roller balls should be filled. No more than 65% of the adjacent bearing housing should be filled. Sealed bearings should be replaced within the listed conditions below with new bearings or as conditions warrant.

Hours of Service Per Year	Relubrication Intervals
5,000	3 years
Continual Normal Services	1 year
Seasonal Service (motor idle for 6+ months)	1 year at beginning of season
Continuous-high ambient, dirty or moist applications	6 months

Bearing Types

A variety of bearings and lubricants are used in all Atlantic Regenerative Blowers. A summary of data is included in the Bearing Specification Table. Greasable bearings are supplied with a sufficient amount of lubricant from our factory to permit initial operation. The frequency of replacing the grease depends upon the conditions, application and amount of use.

Grease Types

Atlantic Regenerative Blowers utilize proprietary lubricants. These lubricants are available from Esso or Exxon. You can check with your local supplier for a recommended equivalent. (High temperature resistance and high speed: NLGI N3 Grade). Lubricants of different manufacturers should not be inter-mixed. If changing lubricant types, the bearing and housing should be thoroughly cleaned to remove all previous lubricants before adding grease from a new supplier.

Bearing Specification (Recommendable Bearing: NSK C3 Grade)

<table>
<tr><th colspan="3">Single Stage</th><th colspan="3">Double Stage</th></tr>
<tr><th>Item</th><th>Front</th><th>Rear</th><th>Item</th><th>Front</th><th>Rear</th></tr>
<tr><td>AB-70/AB-71</td><td rowspan="3">6202zz</td><td rowspan="3">6201zz</td><td>AB102/AB-102/1</td><td rowspan="2">6203zz</td><td rowspan="2">6202zz</td></tr>
<tr><td>AB-80/AB-81</td><td>AB-202/AB-202/1</td></tr>
<tr><td>AB-90/AB-91</td><td>AB-302/AB-302/1</td><td rowspan="3">6204zz</td><td rowspan="3">6204zz</td></tr>
<tr><td>AB-100/101</td><td>6203zz</td><td>6202zz</td><td>AB-402/AB-402/1</td></tr>
<tr><td>AB-200/201</td><td>6204zz</td><td>6203zz</td><td>AB-502</td></tr>
<tr><td>AB-300/301</td><td rowspan="2">6205zz</td><td rowspan="2">6204zz</td><td>AB-602</td><td rowspan="2">6205zz</td><td rowspan="2">6205zz</td></tr>
<tr><td>AB-400/401</td><td>AB-702</td></tr>
<tr><td>AB-500</td><td rowspan="3">6206zz</td><td rowspan="3">6205zz</td><td>AB-802</td><td rowspan="3">6206zz</td><td>6205zz</td></tr>
<tr><td>AB-600</td><td>AB-902</td><td rowspan="2">6207zz</td></tr>
<tr><td>AB-700</td><td>AB-1002</td></tr>
<tr><td>AB-800</td><td rowspan="3">6207zz</td><td rowspan="3">6207zz</td><td>AB-1102</td><td rowspan="5">6207z</td><td rowspan="5">6209z</td></tr>
<tr><td>AB-900</td><td>AB-1202</td></tr>
<tr><td>AB-1000</td><td>AB-1302</td></tr>
<tr><td>AB-1200</td><td rowspan="2">6308z</td><td rowspan="2">6209z</td><td>AB-1402</td></tr>
<tr><td>AB-1300</td><td>AB-1502</td></tr>
<tr><td></td><td></td><td></td><td>AB-1602</td></tr>
</table>

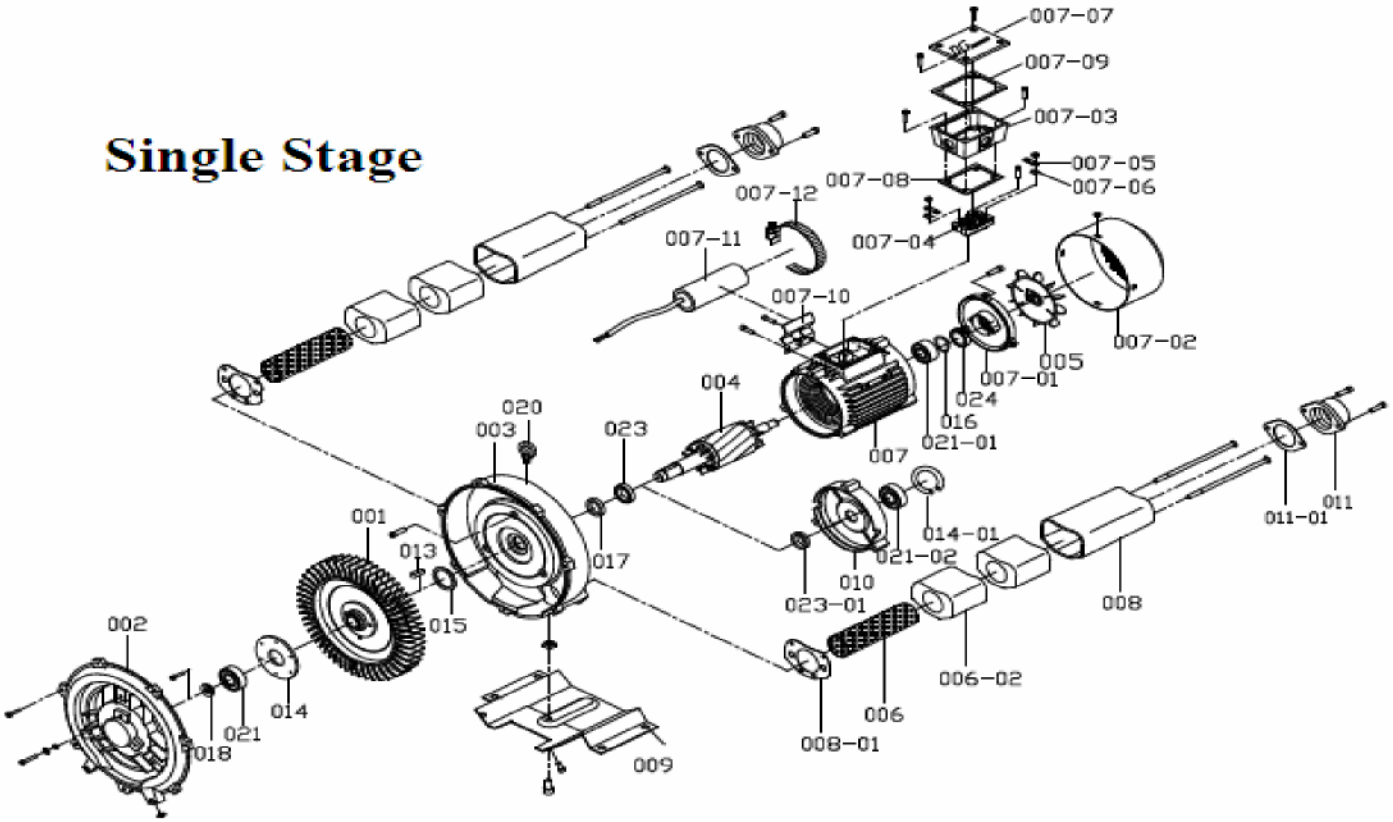
atlantic blowers

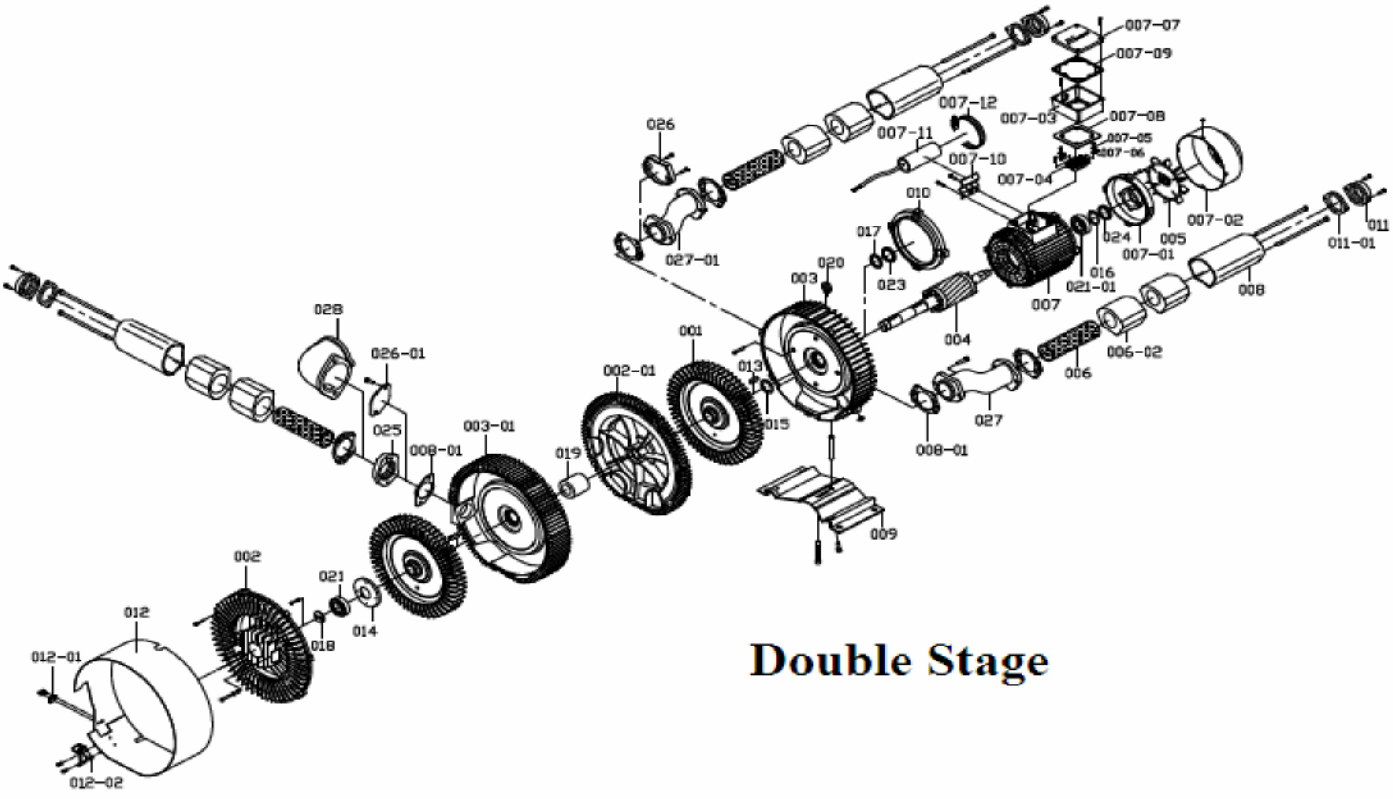
Troubleshooting Chart

Problem	Reason	Remedy
Increased Sound	Noise absorbing foam is damaged Impeller may be rubbing casing inside the blower	Replace foam Replace bearings Send unit to an authorized Atlantic Repair Facility
Excessive Vibration	Damaged impeller Impeller is dirty Improper mounting	Replace impeller Clean impeller Add vibration isolators
Ambient and Exhaust Temperature Increases	Filters are dirty or clogged Back pressure Piping restriction	Replace filter elements Add / check relief valve Piping must be = or > than blower flanges
Decreased Inlet Air Pressure	Inlet air filter is clogged	Clean inlet filter and replace element
Unit is Very Hot	Wrong wiring Phase unbalance Voltage variation Inlet air filter is clogged Blower is dirty Operating pressure or vacuum is too high Operating at no flow Single Phase Operation	Check Wiring Must be within ± 5% Supply proper voltage Replace filter element Clean blower Install a relief valve and pressure or vacuum gauge Remove any restrictions Send unit to an authorized Atlantic Repair Facility
Unusual Sound	Impeller is damaged or jammed Bearing failure One phase broken Bearing failure	Clean or replace impeller Send unit to an Authorized Atlantic Repair Facility
Motor Overload	Phase unbalance Voltage variation	Must be within ± 5% Supply proper voltage Check wire size and wire connections
Unit Does Not Start	Incorrect electrical connection or power source Impeller is damaged or jammed Bearings damaged / defective	Check wiring diagram, fuse capacity and short circuit Clean or replace impeller Replace bearings

atlantic blowers

Single Stage



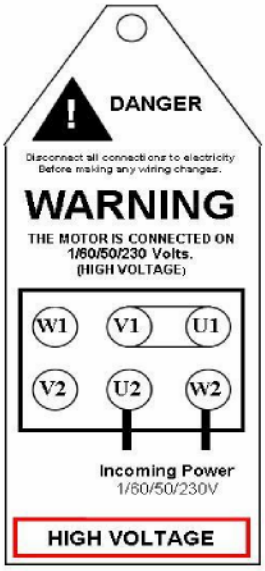


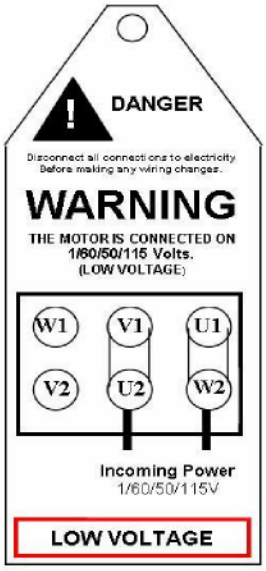
Double Stage

ITEM	PARTS NAME	ITEM	PARTS NAME	ITEM	PARTS NAME	ITEM	PARTS NAME
001	Impeller	007-04	Wire mounting block	013	Rotor pin	Single Stage Only	
002	Blower cover/ back plate	007-05	Wire connection jumper/bridge	014	Bearing washer	007-10	Capacitor mounting bracket
003	Blower housing	007-06	Fixed terminal	015	Washer	007-11	Capacitor
004	Rotor	007-07	Terminal box cover	016	Wear washer	007-12	Steel clamp
005	Fan	007-08	Terminal box gasket	017	Seal	Waterproof Only	
006	Silencer mesh pipe	007-09	Terminal cover gasket	018	Washer	010	Middle motor cover
006-02	Silencer sponge	008	Silencer housing	020	Bronze hoist ring/ lifting ring	014-01	Bearing washer
007	Motor	008-01	Silencer gasket	021	Front bearing	02 1-02	Front bearing
007-01	Motor cover	009	Mounting baseplate	021-01	Rear bearing	023-01	VA-seal
007-02	Fan cover	011	Inlet/outlet flange	023	Front oil seal		
007-03	Terminal box (J-Box)	011-01	Inlet/outlet gasket	024	Rear oil seal		

ITEM	PARTS NAME
Double Stage Only	
025	Muffler mounting bracket
026	Muffler mounting bracket gasket w/ screws
026-0 1	Muffler mounting bracket gasket w/ screws
027	Lateral pipe
027-0 1	Middle motor cover
028	90 degree elbow

TAG #1 Single Phase Dual Voltage
(AB-101, AB-201, AB-301, AB-401)
(AB-102/1, AB-202/1, AB302/1, AB402/1)



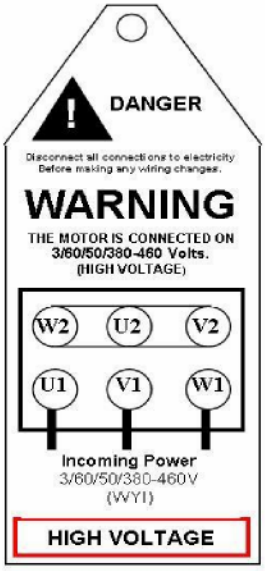


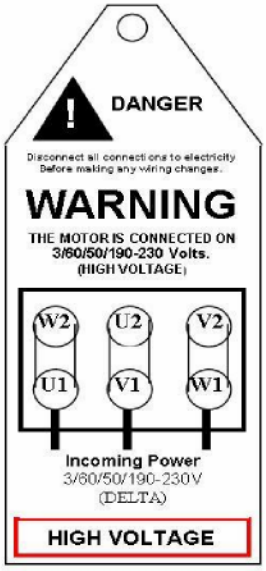
Atlantic Blowers
1225 Capital Dr., Suite 100
Carrollton, TX 75006

214.233.0280 Office
214.233.0281 FAX

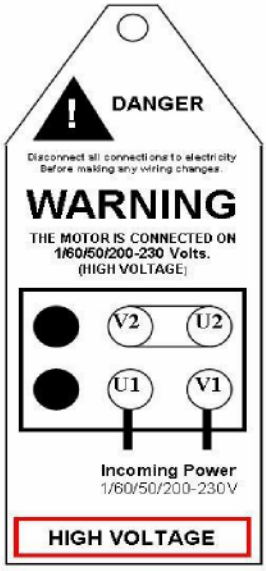
Email: Sales@AtlanticBlowers.com
Website: www.AtlanticBlowers.com

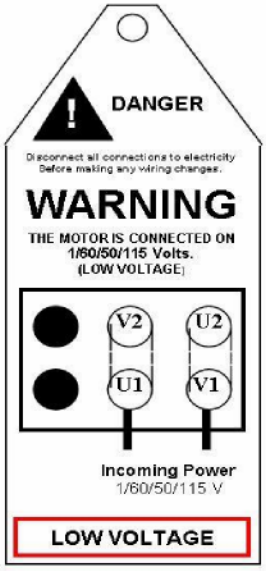
TAG #2 Three Phase Dual Voltage
(AB-70 through AB-1300)
(AB-102 through AB-1602)





TAG #3 Single Phase Dual Voltage
(AB-71, AB-81, AB-91)





Revised: 3/24/09 (Atlantic Blowers New Voltage Tags—2009)

Frequently Asked Questions (FAQ's)

1) **Q - What maintenance does my blower require?**
   A- Virtually none, there is no need to grease/oil the bearings as they are sealed and already lubed when you receive your new blower. Bearings are designed to last at a minimum, 20,000 hours.

2) **Q – How do I know what a normal running temperature is for my blower motor?**
   A – All of our motors are tested to 285F and should NEVER exceed 300F. Bigger blowers will have a higher running temperature due to the higher pressure and stress on the motor. But the same rules still apply, NEVER exceed 300F.

3) **Q – How do I wire my blower?**
   A – There is a wiring diagram located on the underside of the junction box lid. If you are having any issues, contact customer support – (214)233-0280.

4) **Q – Why does my blower keep tripping the breaker?**
   A – On start up, the blower can spike as much as 5x the running amps of the blower, make sure this is taken in to consideration; running amps are displayed on your motor tag. Setups vary widely between customers, so if you're still having issues please contact customer support (214)233-0280.

5) **Q – Why is my blower getting so hot?**
   A – If you're not already using a relief valve, get one, we very highly recommend this for all applications. If you are using one, loosen the adjustable nut and lower the spring tension in order to allow air to travel through the relief valve**. The cooler you keep the motor, the longer your blower will last.**

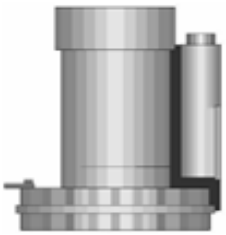
6) **Q – Why is my blower making a humming/whining noise?**
   A – This is the first indication that your bearings are at the end of their life, shut the blower off IMMEDIATELY and do not run until the bearings have been replaced.

7) **Q – How do I know when to replace the bearings?**
   A – If there is no abnormal noise (mentioned above) we recommend that the bearings are replaced after 2 years of continuous use. If the aforementioned happens before the 2 year service mark, follow the answer to question number 6.

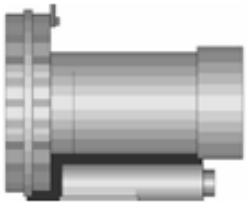
8) **Q – My blower will not turn on, why?**
   A – Call customer support immediately, the motor may be burnt out. We will give you a few options of what to do next to try and get you back up and running – (214)233-0280.

INSTALLATIONS

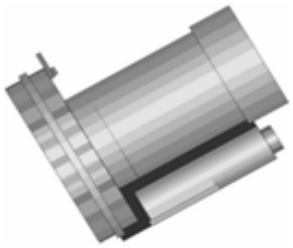
Incorrect Vertical Position



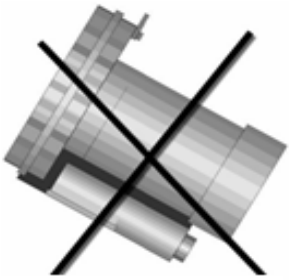
Correct Vertical Position



Correct Horizontal Position



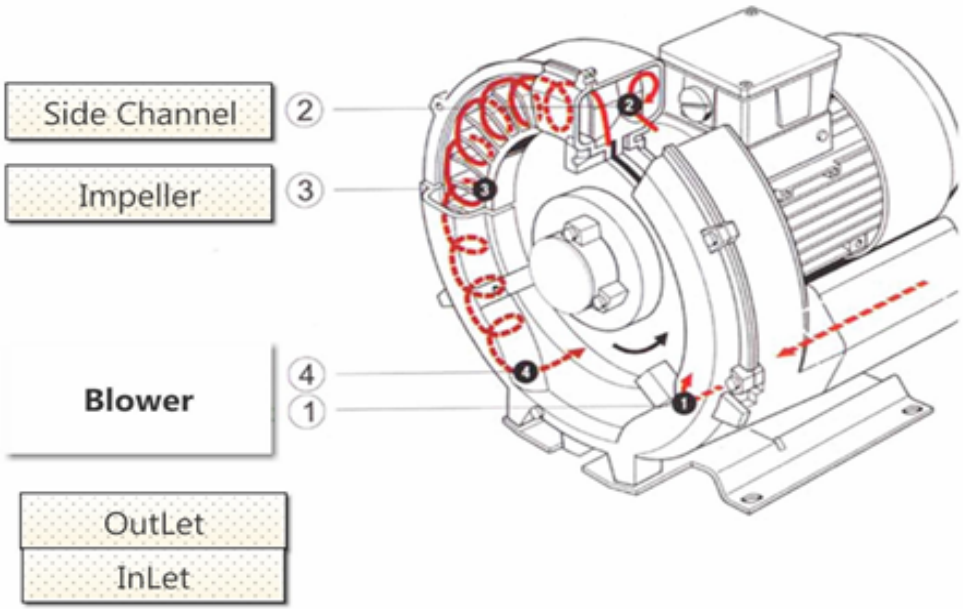
Correct Sloped Position



Incorrect Sloped Position

The impellers in the Atlantic Blowers Regenerative Blowers are mounted directly on the motor shaft for noncontact compression without any friction. Maximum operational reliability, even at high pressure differentials, is ensured by the arrangement of the bearings outside the compression chamber.

The air is taken in through the inlet 1) As it enters the side channel 2) the rotating impeller 3) imparts velocity to the air in the direction of rotation. The centrifugal force of the impeller blades accelerates the air outward and the pressure increases. Every rotation adds kinetic energy, resulting in the further increase of pressure and velocity along the side channel. The pressurized air is then forced to the outlet, discharging it through the muffler 4) where it exits the blower into the atmosphere.



Pressure Conversion Table

PSI	In. H20	In. Hg	mmH20	ATM	kPa	mBar
1	27.73	2.036	703.069	0.06804	6.8947	68.947
0.03605	1	0.0735	25.41	0.00245	0.24908	2.489
0.49116	13.595	1	345.315	0.03342	3.3863	33.863
0.00142	0.03937	0.00289	1	0.0000967	0.009806	0.09806
14.696	406.782	29.921	10332.27	1	101.325	1013.25
0.14503	4.014	0.29529	101.971	0.009869	1	10
0.0145	0.40146	0.02952	10.19716	0.0009869	0.1	1

Flow Conversion Table

CFM	M^3/hr.	M^3/min.
1	1.69901	0.02831
0.58857	1	0.016666
35.3146	60	1

Velocity Conversion Table

Ft/Sec.	Ft/Min.	CM/Sec.	Meter/Sec.	Meter/Min.
1	60	3048	0.3048	18.29
0.01667	1	10.5080	0.0005080	0.3048
0.03281	1.9685	1	0.01	0.600
3.281	196.85	100	1	60
0.0547	3.281	1.667	0.01667	1

Warranty

LIMITED PRODUCT WARRANTY

ATLANTIC BLOWERS("Atlantic Blowers") warrants this Product against defects in material or workmanship, as follows: **A. Labor**	For a period of twelve (12) months from the date of purchase, Atlantic Blowers will, at no charge, repair this Product if determined by Atlantic Blowers to be defective. After the warranty period, the Purchaser must pay all labor charges.
B. Parts	For a period of one (1) year from the date of purchase Atlantic Blowers will, at no charge, supply new or rebuilt replacements for parts determined by Atlantic Blowers to be defective. After the warranty period, the Purchaser must pay all parts charges.
C. Territory	Warranty coverage is worldwide.

During the labor warranty period, to repair the Product, Purchaser will either return the defective Product; freight prepaid, or deliver it to an Atlantic Blowers Service Center or to a service facility authorized by Atlantic Blowers. The Product to be repaired is to be returned in either its original carton or a similar package affording an equal degree of protection. Atlantic Blowers will return the repaired Product freight prepaid to Purchaser. All freight costs associated with replacement of warranty parts after expiration of the original labor warranty period are the responsibility of the Purchaser. Atlantic Blowers is not obligated to provide Purchaser with a substitute unit during the warranty period or at any time. For an additional fee, Atlantic Blowers field service and support at the Purchaser's location is available to Purchaser at Atlantic Blower's prevailing per incident billable rates for such service subject to availability.

The limited warranty stated on this card is subject to all of the fol lowing terms and conditions.

TERMS AND CONDITIONS

1. NOTIFICATION OF CLAIMS: WARRANTY SERVICE: If Purchaser believes that the Product is defective in material or workmanship, then written notice with an explanation of the claim shall be given promptly by Purchaser to Atlantic Blowers but all claims for warranty service must be made within the warranty period. **If after investigation Atlantic Blowers determines that the reported problem was not covered by the warranty, Purchaser shall pay Atlantic Blowers for the cost of investigating the problem at it s then prevailing per incident billable rate.** No repair or replacement of any Product or part thereof shall extend the warranty period as to the entire Product. The specific warranty on the repaired part only shall be in effect for a period of ninety (90) days following the repair or replacement of that part or the remaining period of the Product parts warranty, whichever is greater.

2. EXCLUSIVE REMEDY: ACCEPTANCE: Purchaser's exclusive remedy and Atlantic Blower's sole obligation is to supply (or pay for) all labor necessary to repair any Product found to be defective within the warranty period and to supply, at no extra charge, new or rebuilt replacements for defective parts. If repair or replacement fails to remedy the defect, then, and only in such event, shall Atlantic Blowers refund to Purchaser the purchase price for such Product. Purchaser's failure to make a claim as provided in paragraph 1 above or continued use of the Product shall constitute an unqualified acceptance of such Product and a waiver by Purchaser of all claims thereto.

3. EXCEPTIONS TO LIMITED WARRANTY: Atlantic Blowers shall have no liability or obligation to Purchaser with respect to any Product requiring service during the warranty period which is subjected to any of the following: abuse, improper use: negligence, accident, modification, failure of the end-user to follow the operating procedures outlined in the user's manual, failure of the end-user to follow the maintenance procedures in the service manual for the Product where a schedule is specified for regular replacement or maintenance or cleaning of certain parts (based on usage) and the end-user has failed to follow such schedule; attempted repair by non-qualified personnel; operation of the Product outside of the published environmental and electrical parameters, or if such Product's original identification (trademark, serial number) markings have been defaced, altered, or removed. Atlantic Blowers excludes from warranty coverage Products sold AS IS and/or WITH ALL FAULTS and excludes used Products which have not been sold by Atlantic Blowers to the Purchaser. Atlantic Blowers also excludes from warranty coverage consumable items such as filters and valves. All material and accompanying documentation furnished with, or as part of the Product is furnished **"AS IS"** (i.e., without any warranty of any kind), except where expressly provided otherwise in any documentation or license agreement furnished with the Product. Blower(s), coverage will be denied if a filter and relief valve were not used during normal operation. This warranty does not apply to electrical controls and gasoline engines not supplied by Atlantic and does not extend to any goods or parts which have been subjected to misuse, lack of maintenance, neglect, damage by accident or transit damage. Decomposition by chemical reaction and chemical precipitate, or wear caused by the presence of abrasive materials shall not constitute defects.

4. **Liability:** Atlantic is not responsible or liable for indirect or consequential damages of any kind however, including but not limited to those for use of any products, loss of time, inconvenience, lost profit, labor charges, or other incidental or consequential damages with respect to persons, business, or property, whether as a result of breach of warranty, negligence or otherwise.

5. **PROOF OF PURCHASE:** The Purchaser's dated invoice must be retained as evidence of the date of purchase and to establish warranty eligibility.

6. **PRODUCT REGISTRATION:** Registration of any Product or of this limited warranty is voluntary; failure to register will not diminish any rights available under this warranty.

DISCLAIMER OF WARRANTY

EXCEPT FOR THE FOREGOING WARRANTIES, ATLANTIC BLOWERS HEREBY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY AND/OR ALL IMPLIED WARRANTIES OF MERCHANTABIL ITY, FITNESS FOR A PARTICULAR PURPOSE AND/OR ANY WARRANTY WITH REGARD TO ANY CLAIM OF INFRINGEMENT THAT MAY BE PROVIDED IN SECTION 2-312(3) OF THE UNIFORM COMMERCIAL CODE AND/OR IN ANY OTHER COMPARABLE STATE STATUTE. ATLANTIC BLOWERS HEREBY DISCLAIMS ANY REPRESENTATIONS OR WARRANTY THAT THE PRODUCT IS COMPATIBLE WITH ANY COMBINATION OF NON-ATLANTIC BLOWERS PRODUCTS PURCHASER MAY CHOOSE TO CONNECT TO THE PRODUCT.

LIMITATION OF LIABILITY

THE LIABILITY OF ATLANTIC BLOWERS, IF ANY, AND PURCHASER' S SOLE AND EXCLUSIVE REMEDY FOR DAMAGES FOR ANY CLAIM OF ANY KIND WHATSOEVER, REGARDLESS OF THE LEGAL THEORY AND WHETHER ARISING IN TORT OR CONTRACT, SHALL NOT BE GREATER THAN THE ACTUAL PURCHASE PRICE OF THE PRODUCT WITH RESPECT TO WHICH SUCH CLAIM IS MAD E. IN NO EVENT SHALL ATLANTIC BLOWERS BE LIABLE TO PURCHASER FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO, COMPENSATION, REIMBURSEMENT OR DAMAGES ON ACCOUNT OF THE LOSS OF PRESENT OR PROSPECTIVE PROFITS OR FOR ANY OTHER REASON WHATSOEVER.

For further information and the name of the nearest authorized Atlantic Blowers service facility contact:

United States of America

Atlantic Blowers

Customer Services

1225 Capital Dr., Suite 100
Carrollton, TX 75006
(214) 233-0280
www.atlanticblowers.com
sales@atlanticblowers.com

Bearing Replacement Procedure

Front Bearings:

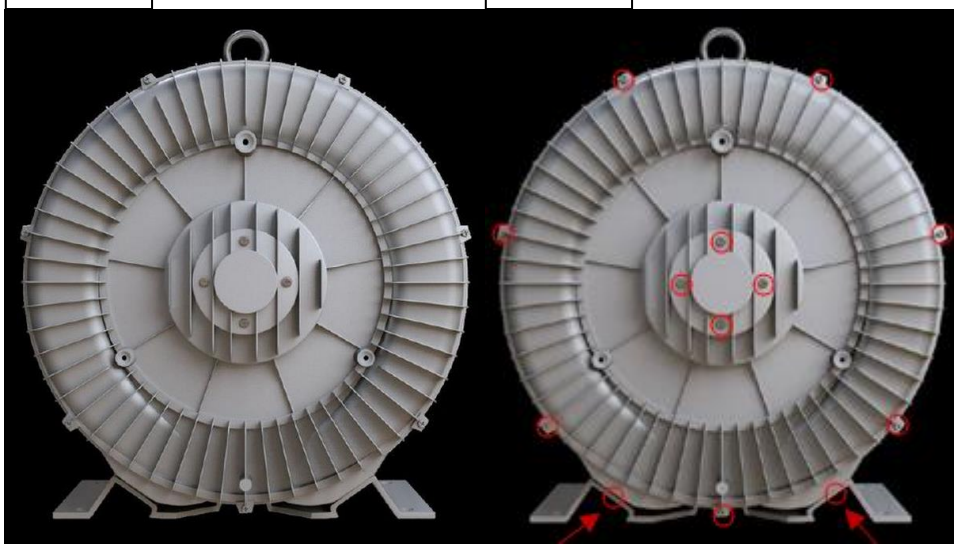
**Note: Refer to page 3 & 4 for part numbers mentioned below.

Step 1*: Removing the (002) Blower Cover.*

The **(002) Blower Cover** is secured to the **(003) Blower Housing** with 11 screws; 7 screws joining the outer edge, and 4 screws joining the 'inner hub' of the **(002) Blower Cover** to the **(014) Bearing Washer**. On some blowers, there are also 2 Allen screws underneath that hold the **(002) Blower Cover** to the **(009) Mounting Baseplate**. Begin by removing the inner 4 screws, and then remove the remaining 7 screws in a star pattern until they are evenly dislodged. Before removing the **(002) Blower Cover**, make sure the 2 lower Allen screws have been removed (if applicable), indicated with 2 arrows on "Image B" below.

Image A

Image B



Step 2: *Replacing the (021) Font Bearing.*

The tight tolerances within the blower may make the **(002) Blower Cover** difficult to remove. If you must use something to pry off the **(002) Blower Cover**, we suggest using a piece of wood. This reduces the risk of damaging any important components inside the blower. Any damage done to the impeller could be irreversible. Once the **(002) Blower Cover** is off, you will see the **(021) Front Bearing**, located at the end of the **(004) Rotor** shaft. Remove the screw holding the **(018) Washer** on the end of the shaft, and remove the old **(021) Font Bearing**. Finally, slide the new **(021) Front Bearing** on and, re install the (018) Washer to the end of the **(004) Rotor** shaft.

Step 3: *Reassembly of the (002) Blower Cover and (003) Blower Housing.*

You can now begin to put the blower back together. Align the **(002) Blower Cover** in its proper position and gently recede the cover into its fitted slot. The **(002) Blower Cover** should slip in smoothly, but have a little resistance. Do NOT force the **(002) Blower Cover** on, this will cause complications when tightening the outer rim to the **(003) Blower Housing**. Always start by aligning the 4 "inner hub" screw holes with the **(014) Bearing Washer**. You can use a thin screwdriver to hold the alignment of the **(014) Bearing Washer** in place while you guide the first screw in. Once all 4 screws have been set (**NOTE: you may have to tighten each screw more than once), proceed to tighten the outer rim of the **(002) Blower Cover** to the **(003) Blower Housing**. Always do this in a star pattern to ensure it is seated evenly. Finally, install the 2 Allen screws at the bottom of the **(009) Mounting Baseplate**, and tighten to the **(002) Blower Cover** (if applicable).

Rear Bearings:

Image C

Step 1: *Removing the (007-02) Fan Cover, (005) Fan, and (007-01) Motor Cover.*

Begin by removing the 3 screws located on the left, right, and top of the **(007-02) Fan Cover** (see "Image C") and remove. Next, remove the **(005) Fan.** You will see the motor cooling **(005) Fan** is clamped to the end of the rotor with 1 or 2 screws - depending on blower model. Loosen one (or both) tension nut(s) and, gently slide the **(005) Fan** off of the **(004) Rotor**. The **(007-01) Motor Cover** is joined to the **(007) Motor** with 4 screws. Remove the 4 screws and *gently* slide off the **(007-01) Motor Cover** until it is completely detached. <u>NOTE: Make sure the **(016) Wear Washer** is accounted for and re-installed later.</u>

Step 2: *Replacing the (021-01) Rear Bearing.*

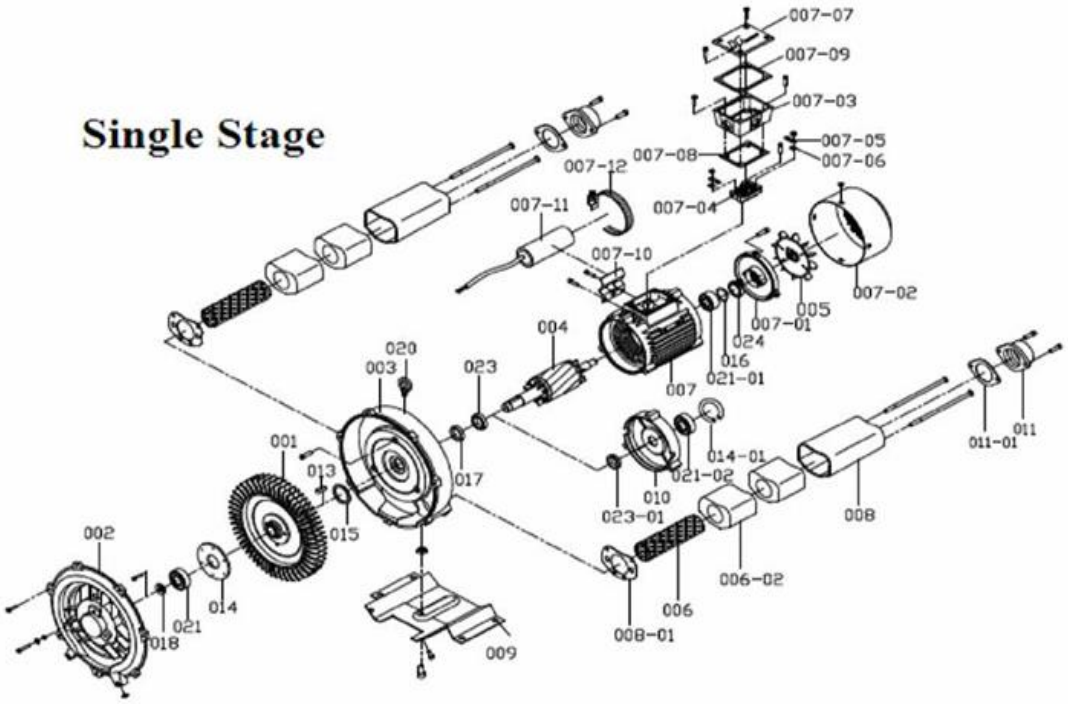
The (**021-01) Rear Bearing** will be seated close to the end of **(004) Rotor,** with the **(016) Wear Washer** seated between the (**021-01) Rear Bearing** and **(007-01) Motor Cover**. Remove the old (**021-01) Rear Bearing** (use a puller if necessary). When looking at the **(004) Rotor**, you will notice that the shaft steps up in diameter the closer you get to the **(007) Motor**. When installing the new (**021-01) Rear Bearing**, it is <u>*extremely important*</u> to seat the bearings' inner raceway against the stepped up diameter of the shaft.

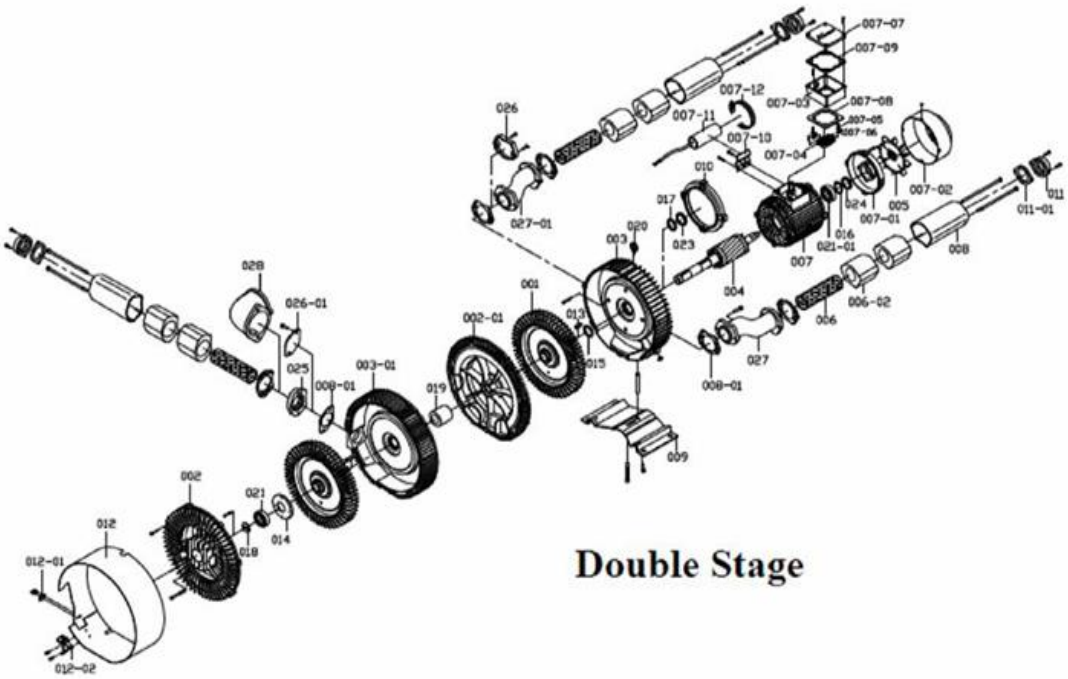
Step 3: *Reassembly of the (007-02) Fan Cover, (005) Fan, and (007-01) Motor Cover.*

Make sure the **(016) Wear Washer** is in its respective location. Then gently slip the **(007-01) Motor Cover** over the (**021-01) Rear Bearing.** This action should <u>NOT</u> be forced. Tighten the 4 joining screws in a star pattern. Slide the **(005) Fan** on to the remaining portion of the **(004) Rotor** and tighten the 1 (or 2) screw(s). Finally, reinstall the **(007-02) Fan Cover.**

atlantic blowers

Single Stage





Double Stage

ITEM	PARTS NAME	ITEM	PARTS NAME	ITEM	PARTS NAME	ITEM	PARTS NAME
001	Impeller	007-04	Wire mounting block	013	Rotor pin	Single Stage Only	
002	Blower cover/ back plate	007-05	Wire connection jumper/bridge	014	Bearing washer	007-10	Capacitor mounting bracket
003	Blower housing	007-06	Fixed terminal	015	Washer	007-11	Capacitor
004	Rotor	007-07	Terminal box cover	016	Wear washer	007-12	Steel clamp
005	Fan	007-08	Terminal box gasket	017	Seal	Waterproof Only	
006	Silencer mesh pipe	007-09	Terminal cover gasket	018	Washer	010	Middle motor cover
006-02	Silencer sponge	008	Silencer housing	020	Bronze hoist ring/ lifting ring	014-01	Bearing washer
007	Motor	008-01	Silencer gasket	021	Front bearing	02 1-02	Front bearing
007-01	Motor cover	009	Mounting baseplate	021-01	Rear bearing	023-01	VA-seal
007-02	Fan cover	011	Inlet/outlet flange	023	Front oil seal		
007-03	Terminal box (J-Box)	011-01	Inlet/outlet gasket	024	Rear oil seal		

ITEM	PARTS NAME
Double Stage Only	
025	Muffler mounting bracket
026	Muffler mounting bracket gasket w/ screws
026-01	Muffler mounting bracket gasket w/ screws
027	Lateral pipe
027-01	Middle motor cover
028	90 degree elbow

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Appendix D:

Quality Assurance Project Plan

Sonero Metro City Auto Site
NYS BCP Site No. C203148
1001 Whitlock Avenue
BRONX, NEW YORK

Quality Assurance Project Plan (QAPP)

Prepared for:

Whitlock Point LLC and Whitlock Point Services LLC
5959 Broadway, Suite 3
Bronx, NY 10459

Prepared by:
SESI CONSULTING ENGINEERS, D.P.C.
959 Route 46E
Parsippany, NJ 07054

MAY 2022
REVISED AUGUST 2023

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1.0 PROJECT DESCRIPTION

This document presents the Quality Assurance Project Plan (QAPP) for the Site Management Plan (SMP) for the proposed development at 1001 Whitlock Avenue, Bronx, New York (the "Site"). The Site consists of approximately 0.788-acres. The Site is identified on the tax map as tax parcel Block 2756, Lot 85.

The Site is an area characterized by a mix of residential, commercial, industrial, and manufacturing developments. The Site is bounded by a vacant industrial building to the north, Aldus Street to the south, Whitlock Avenue to the east, and Longfellow Avenue to the west. There are no surface water bodies or streams on or directly adjacent to the Site. SESI did not observe any areas suspected to be wetlands on the Site. Storm water drainage patterns are generally consistent with the surrounding topography and primarily flow to the north. The topographic map indicates that the topography at the Site slopes in a northerly direction.

2.0 PROJECT ORGANIZATION

The SMP activities will be conducted by SESI Consulting Engineers DPC (SESI) and their qualified subcontractors, on behalf of Whitlock Point LLC and Whitlock Point Services LLC. The organization of SESI's key project management and field staff, and respective areas of responsibility, is presented below along with the names of subcontractors

SESI Personnel and Subcontractors		
Role	**Name**	**Telephone No.**
Project Principal	Fuad Dahan, P.E., PhD	973-808-9050 x249
Project Manager (PM)	Jesse Mausner, P.G.	973-808-9050 x282
Principal Engineer	Fuad Dahan, P.E., PhD	973-808-9050 x249
Remedial Action Project Manager	Chris Malvicini	973-808-9050
Field Team Leader	Shannon Grogan	973-808-9050
Quality Assurance Officer	Joe Scardino	973-808-9050 x267
Field Personnel	TBD	
Analytical Laboratory	Alpha Analytical	201-972-6356
Data Validator	Hanibal Tayeh	413-875-5049
Driller	Coastal Environmental	631-942-9209

2.1 PROJECT PRINCIPAL

Provide technical and administrative oversight and guidance throughout the project, assist in securing company resources, participate in technical review of deliverables, and attend key meetings as needed.

2.2 PRINCIPAL ENGINEER

Provide technical guidance and review of reports, analytical data. Will have key involvement in screening and development of remedial alternatives.

2.3 PROJECT MANAGER

Responsible for maintaining the day-to-day schedule for completing the fieldwork and deliverables according to BCP program requirements and client expectations.

2.4 REMEDIAL ACTION WORK PLAN MANAGER

Responsible for coordinating and directing field efforts of SESI staff and subcontractors, and for maintaining that work is done according to QAPP specifications.

2.5 FIELD TEAM LEADER

Responsible for overseeing field work during the implementation of the RAWP, including observing subcontractors, maintaining field notes, and collecting samples of various environmental media, in accordance with the NYSDEC-approved Work Plan.

2.6 QUALITY ASSURANCE OFFICER

Responsible for reviewing sampling procedures and certify that the data was collected and analyzed using the appropriate procedures.

3.0 QA/QC OBJECTIVES FOR MEASUREMENT OF DATA

In cases where NYSDOH ELAP Certification exists for a specific group or category of parameters, the laboratory performing analysis in connection with this project will have appropriate NYSDOH ELAP Certification. Alpha Analytical Laboratories of Westborough, MA, an ELAP-certified lab, will be performing the sample analyses for the project. Analytical Service Protocol (ASP, June 2000) Category B deliverables are required for all samples. All data will be sent to a third party, Hanibal C. Tayeh, for validation in accordance with NYSDEC BCP requirements.

Detection limits set by NYSDEC-ASP will be used for all sample analyses unless otherwise noted. If NYSDEC-ASP-dictated detection limits prove insufficient to assess

project goals (i.e., comparison to drinking water standards or attainment of Applicable or Relevant and Appropriate Requirements [ARARs]), then ASP Special Analytical Services (SAS) or other appropriate methods will be utilized.

The quality assurance/quality control objectives for all measurement data include completeness, representativeness, comparability, precision and accuracy.

3.1 COMPLETENESS

The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. Data must meet QC acceptance criteria for 100 percent or more of requested determinations.

3.2 REPRESENTATIVENESS

Samples must be taken of the population and, where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where Target Compound List (TCL) volatiles are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for TCL volatile organic compounds along with the groundwater samples to ensure that contamination with TCL volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for TCL volatile organic compounds. The TCL compounds are identified in the United States

Environmental Protection Agency (USEPA) Contract Laboratory Program dated 10/2016 or as periodically updated.

The analysis results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

3.3 COMPARABILITY

Consistency in the acquisition, preparation, handling and analysis of samples is necessary in order for the results to be compared where appropriate. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To ensure the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved methods. The NYSDEC-ASP mandated holding times for various analyses will be strictly adhered to.

3.4 PRECISION AND ACCURACY

The validity of the data produced will be assessed for precision and accuracy. Analytical methods which will be used include gas chromatography/mass spectrometry (GC/MS), gas chromatography (GC), colorimetry, atomic spectroscopy, gravimetric and titrametric techniques. The following outlines the procedures for evaluating precision and accuracy, routine monitoring procedures, and corrective actions to maintain analytical quality control. All data evaluations will be consistent with NYSDEC-ASP procedures (June 2000). Data will be 100 percent compliant with NYSDEC-ASP requirements.

The number of duplicate, spiked and blank samples analyzed will a minimum of 1 duplicate for every 20 samples per each medium of groundwater and soil. The inclusion and frequency of analysis of field blanks will be on the order of one per every 20 samples (soil) for the aqueous matrix field blanks will be collected at a frequency of one per day. Samples to be analyzed for volatile organic compounds will be accompanied by a trip blank for each shipment and field blanks (water matrix) or field blanks (soil). An equipment blank for PFAS will be collected once per day per matrix, regardless of whether equipment being used is disposable.

Quality assurance audit samples will be prepared and submitted by the laboratory QA manager for each analytical procedure used. The degree of accuracy and the recovery of analyte to be expected for the analysis of QA samples and spiked samples is dependent upon the matrix, method of analysis, and compound or element being determined. The concentration of the analyte relative to the detection limit is also a major factor in determining the accuracy of the measurement. The lower end of the analytical range for most analyses is generally accepted to be five times the detection limit. At or above this level, the determination and spike recoveries for metals in water samples will be expected to range from 75 to 125 percent. The recovery of organic surrogate compounds and matrix spiking compounds determined by GC/MS will be compared to the guidelines for recovery of individual compounds as established by the United States Environmental Protection Agency Contract Laboratory Program dated 7/85 or as periodically updated.

The quality of results obtained for inorganic ion and demand parameters will be assessed by comparison of QC data with laboratory control charts for each test.

4.0 SAMPLING PROCEDURES

4.1 SAMPLING PROGRAM

The sampling program for the SMP will include soil vapor and soil vapor extraction (SVE) effluent. Soil vapor samples will be collected from vapor points screened in the vadose zone using Summa Canisters.

4.2 SOIL VAPOR SAMPLING

Soil vapor sampling will be conducted in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in New York State (October 2006). Soil vapor samples will be collected in the vadose zone from shallow (5 feet maximum) vapor points. Each vapor point will be installed in a shallow boring drilled either by hand-operated equipment (e.g. hand auger or percussion hammer drill), or by a small truck-mounted drill rig. Drilling equipment used shall be based on soil or concrete surface conditions, and the method that provides the most practical approach.

Each vapor point will consist of an inert sampling tube (polyethylene, stainless steel, or Teflon®) with a 6-inch screened section at the bottom through which soil vapors can be sampled. The screen slot size will be 0.0075 inches. A sampling zone will be

created around the screened section by backfilling with 1 to 2 feet of porous coarse sand or glass beads, and at least three feet of bentonite will be placed above the porous sampling zone to form a seal from the surface. Native clean soil will be packed around the remaining annulus to the ground surface.

The regulator will be set to collect a soil vapor sample at a flow rate of less than 0.2 liters per minute. After the summa canister is filled, the valve will be closed.

Each canister will be listed according to a specific sample I.D. on a chain of custody form. Sample canisters will be delivered to the laboratory within 24 hours and analyzed for VOCs by method TO-15. The detection limit for VOCs will be 1 µg/m^3 or less.

The subsurface soil vapor sampling effort will include the use of inert helium tracer gas to verify that the soil vapor samples are not diluted by ambient air. The atmosphere around the sampling tube will be enriched with the tracer gas, and the soil vapor sample will be collected in the presence of the enriched tracer atmosphere. This will be accomplished by placing an inverted plastic pail over the sampling point and filling the pail with the tracer gas via a small tube penetrating the site of the pail. Refer to NYSDOH Guidance for Evaluating Indoor Air Intrusion in New York State (October 2006). SVE effluent and influent samples will not require helium tracer gas for collection.

Weather conditions in the 48 hours prior to the test, and during the test, will be noted, including average wind speed, precipitation, temperature, and barometric pressure.

4.3 SAMPLE PRESERVATION AND SHIPMENT

Since all bottles will contain the necessary preservatives as shown in Table 4.2, they need only be filled. The 40 ml VOA vials must be filled brim full with no air bubbles. The other bottles should be filled to within about 1 inch from the top.

The bottles will be sent from the laboratory in coolers which will be organized on a per site basis. Following sample collection, the bottles should be placed on ice in the shipping cooler. The samples will be cooled to 4°C, but not frozen.

Final packing and shipment of coolers will be performed in accordance with guidelines outlined in the ASP.

5.0 SAMPLE CUSTODY

The program for sample custody and sample transfer is in compliance with the NYSDEC-ASP, as periodically updated. If samples may be needed for legal purposes, chain-of-custody procedures, as defined by NEIC Policies and Procedures (USEPA-330/9-78-001-R, Revised June 1988) will be used. Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples should be minimized.

5.1 FIELD SAMPLE CUSTODY

A chain-of-custody record accompanies the samples from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation, and return to the laboratory. Two copies of this record follow the samples to the laboratory. The laboratory maintains one file copy and the completed original is returned to the site inspection team. Individual sample containers provided by the laboratory are used for shipping samples. The shipping containers are insulated, and ice is used to maintain samples at approximately 4°C until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container are individually labeled and controlled. Samples are to be shipped to the laboratory within 24-48 hours of the day of collection depending on parameter holding times.

Each sample shipping container is assigned a unique identification number by the laboratory. This number is recorded on the chain-of-custody record and is marked with indelible ink on the outside of the shipping container. The field sampler will indicate the sample designation/location number in the space provided on the appropriate chain-of-custody form for each sample collected. The shipping container is closed, and a seal provided by the laboratory is affixed to the latch. This seal must be broken to open the container, and this indicates possible tampering if the seal is broken before receipt at the laboratory. The laboratory will contact the site investigation team leader and the sample will not be analyzed if tampering is apparent.

5.2 LABORATORY SAMPLE CUSTODY

The site investigation team leader or Project Quality Assurance Officer notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program meets the following criteria:

The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.

Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.

Care is exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the site investigation team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.

1. The samples are stored in a secured area at a temperature of approximately 4°C until analyses are to commence.
2. A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
3. A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project records.

5.3 FINAL EVIDENCE FILES

Final evidence files include all originals of laboratory reports and are maintained under documented control in a secure area.

A sample or an evidence file is under custody if:

- It is in your possession; it is in your view, after being in your possession.
- It was in your possession, and you placed it in a secure area.
- It is in a designated secure area.

6.0 CALIBRATION PROCEDURES

Instruments and equipment used to gather, generate or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the appropriate manufacturer's specifications or project specific requirements. The procedures for instrument calibration, calibration

verification, and the frequency of calibrations are described in the ASP. The calibration of instruments used for the determination of metals will be as described in the appropriate CLP standard operating procedures.

Calibration of other instruments required for measurements associated with these analyses will be in accordance with the manufacturer's recommendations and the standard operating procedures of the laboratory.

7.0 ANALYTICAL PROCEDURES

Analytical procedures shall conform to the most recent revision of the NYSDEC-ASP (June 2005) and are summarized on Table 7.1. In the absence of USEPA or NYSDEC guidelines, appropriate procedures shall be submitted for approval by NYSDEC prior to use.

The procedures for the sample preparation and analysis for organic compounds are as specified in the NYSDEC-ASP. Analytical cleanups are mandatory where matrix interferences are noted. No sample shall be diluted any more than a factor of five. The sample shall be either re-extracted, re-sonicated, re-stream distilled, etc. or be subjected to any one analytical cleanup noted in SW846 or a combination thereof. The analytical laboratory shall expend such effort and discretion to demonstrate good laboratory practice and demonstrate an attempt to best achieve the method detection limit.

7.1 VOLATILE ORGANICS

For the analysis of water samples for Target Compound List (TCL), volatile organic compounds (VOCs), no sample preparation is required. The analytical procedure for volatiles is detailed in NYSDEC-ASP (Volume I, Section D-I). A measured portion of the sample is placed in the purge and trap apparatus and the sample analysis is performed by gas chromatography/mass spectrometry for the first round. USEPA Method 8260 will be used, plus tentatively identified compounds (TICs). USEPA Methods 8010 or 8020 (gas chromatography with different detectors) will be used if subsequent rounds with lower limits of detection are warranted. For soil vapor and SVE effluent samples, the analysis will be via USEPA TO-15 for VOCs.

7.2 SITE SPECIFICITY OF ANALYSES

Work plans prepared for remedial actions for sites contain recommendations for the chemical parameters to be determined for each site. Thus, some or all of the referenced methods will apply to the analysis of samples collected at the individual waste sites. Analyses of VOCs will be performed on all vapor samples.

TABLES

TABLE 4.1 SAMPLING PROCEDURE FOR MONITORING WELLS USING LOW-STESS (LOW-FLOW) METHODS

1. Initial static water level recorded with an electric contact probe accurate to the nearest 0.1 foot.

2. Sampling device is lowered into well. Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well. Pump intake must be no less than 2 feet from the bottom of the well to prevent disturbance and resuspension of sediments which may be at the bottom of the well.

3. Measure water level again: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

4. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

5. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

    a. 0.1 for pH
    b. 3% for specific conductance (conductivity)
    c. 10 mv for redox potential
    d. 10% for DO and turbidity

6. Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

7. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.

8. Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and

equal volume of water (e.g., 40 ml). Groundwater purged from the well prior to sampling can be used for this purpose.

9. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

10. Measure and record well depth.

11. Close and lock the well.

12. Samples are capped, labeled and placed in laboratory coolers with ice packs or bagged ice.

13. All equipment is cleaned with successive rinses of pesticide-grade methanol and distilled water.

    a. Dedicated line is disposed of or left at well site.

14. Equipment/wash blanks are collected when non-dedicated sampling equipment is used.

15. Chain-of-custody forms are completed in triplicate.

    a. The original and one carbon copy are put into a zip-lock bag and placed into the cooler. The original will be returned following sample analysis.
    b. A second carbon copy is kept on file.

16. Cooler is sealed with strapping tape and chain-of-custody seals to assure integrity and to prevent tampering of sample.

TABLE 4.2 SAMPLE CONTAINERIZATION

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE(1)	HOLDING TIME
Aqueous Samples				
VOCs – USEPA 8260C	2	40 mL, glass vial with septum cap	Hydrochloric Acid to pH <2	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270D	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)
Pesticides – USEPA 8081B	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)

PARAMETER & ANALYTICAL METHOD	NO.	BOTTLE TYPE	PRESERVATIVE(1)	HOLDING TIME
PCBs – USEPA 8082A	2	1-liter amber glass bottle	None	7 days (until extraction) 40 days (extracted)
Metals(2)	1	1-liter, plastic bottle	Nitric acid to pH <2 NaOH for cyanide	180 days Cyanide: 14 days Mercury: 28 days
Cyanide – SM 4500-CN-E	1	1-liter, plastic	Sodium Hydroxide to pH >12	14 days
PFAS Compounds – USEPA 537	2	500 ml HDPE or Polypropylene with non-Teflon lid	None	14 days
Soil, Sediment, Solid Waste Samples				
VOCs – USEPA 8260C	3	15-gram EnCore samplers	Chilled to 0 - 6°C	14 days
SVOCs (BNAs) and 1,4-Dioxane – USEPA 8270D or E	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction, 40 days extracted)
Pesticides – USEPA 8081B	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	14 days (until extraction) 40 days (extracted)
PCBs – USEPA 8082A	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	None
Metals(2)	1	4-oz. glass jar with Teflon lid	Chilled to 0 - 6°C	180 days Cyanide: 14 days Mercury: 28 days
PFAS Compounds – USEPA 537	2	500 ml HDPE or Polypropylene with non-Teflon lid	None	28 days
Soil Vapor / Indoor Air Samples				
VOCs – USEPA TO-15	1	Summa Canister	None	30 days

(1) All samples will be preserved with ice during collection and shipment.
(2) Metals refers to the 24 metals and cyanide in the Target Compound List (NYSDEC-CLP 11/87). Metals will be analyzed by Method 6010D, 7470A for mercury, and 9012B for cyanide
(3) A complete list of compounds is provided on Table 7.1.

TABLE 7.1 – CONTRACT-REQUIRED QUANTITATION LEVELS AND ANALYTICAL METHODS FOR ASP INORGANICS, ASP VOLATILES, ASP SEMI-VOLATILES, ASP PESTICIDES, AND PCBS

Target Compound List (TCL) and Contract-Required Quantitation Limit

SECTION 1 - ASP INORGANICS Method: NYSDEC-ASP-91-4					
	PARAMETER	**CONTRACT-REQUIRED DETECTION LEVEL* (µg/L)**		**PARAMETER**	**CONTRACT-REQUIRED DETECTION LEVEL* (µg/L)**
1.	Aluminum	200	13.	Magnesium	5,000
2.	Antimony	60	14.	Manganese	15
3.	Arsenic	15	15.	Mercury	0.2
4.	Barium	200	16.	Nickel	40
5.	Beryllium	5	17.	Potassium	5,000
6.	Cadmium	5	18.	Selenium	35
7.	Calcium	5,000	19.	Silver	10
8.	Chromium	10	20.	Sodium	5,000
9.	Cobalt	50	21.	Thallium	25
10.	Copper	25	22.	Vanadium	50
11.	Iron	100	23.	Zinc	60
12.	Lead	10	24.	Cyanide	10

SECTION 2 – ASP ORGANICS (VOLATILES) Method: NYSDEC-ASP-91-1					
	VOLATILE	**CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)**		**VOLATILE**	**CONTRACT-REQUIRED QUANTITATION LIMIT** (µg/L)**
1.	Chloromethane	5.0	18.	1,2-Dichloropropane	5.0
2.	Bromomethane	5.0	19.	cis-1,3-Dichloropropene	5.0
3.	Vinyl Chloride	5.0	20.	Trichloroethene	5.0
4.	Chloroethane	5.0	21.	Dibromochloromethane	5.0
5.	Methylene Chloride	5.0	22.	1,1,2-Trichloroethane	5.0
6.	Acetone	10.0	23.	Benzene	5.0
7.	Carbon Disulfide	5.0	24.	Trans-1.3-Dichloropropene	5.0
8.	1,1-Dichloroethylene	5.0	25.	Bromoform	5.0
9.	1,1-Dichloroethane	5.0	26.	2-Hexanone	10.0
10.	1,2-Dichloroethylene (total)	5.0	27.	4-Methyl, 1,2-Pentanone	10.0
11.	Chloroform	5.0	28.	Tetrachloroethylene	5.0
12.	1,2-Dichloroethane	5.0	29.	Toluene	5.0
13.	2-Butanone	10.0	30.	Chlorobenzene	5.0
14.	1,1,1-Trichloroethane	5.0	31.	Ethylbenzene	5.0
15.	Carbon Tetrachloride	5.0	32.	Styrene	5.0
16.	Bromodichloromethane	5.0	33.	Total Xylenes	5.0
17.	1,1,2,2-Tetrachloroethane	5.0			

SECTION 3 - ASP ORGANICS (SEMI-VOLATILES) Method: NYSDEC-ASP-91-2					
	SEMI-VOLATILE	**CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)**		**SEMI-VOLATILE**	**CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)**
1.	Phenol	5.0	33.	Acenaphthene	5.0
2.	Bis(2-chloroethyl)ether	5.0	34.	2,4-Dinitrophenol	10.0
3.	2-Chlorophenol	5.0	35.	4-Nitrophenol	10.0
4.	1,3-Dichlorobenzene	5.0	36.	Dibenzofuran	5.0
5.	1,4-Dichlorobenzene	5.0	37.	Dinitrotoluene	5.0
6.	1,2-Dichlorobenzene	5.0	38.	Diethylphthalate	5.0
7.	2-Methylphenol	5.0	39.	4-Chlorophenyl phenyl ether	5.0
8.	2,2'oxybis(1-Chloropropane)	5.0	40.	Fluorene	5.0
9.	4-Methylphenol	5.0	41.	4-Nitroanile	10.0
10.	N-Nitroso-dipropylamine	5.0	42.	4,6-Dinitro-2-methylphenol	10.0
11.	Hexachloroethane	5.0	43.	N-nitrosodiphenyl amine	5.0
12.	Nitrobenzene	5.0	44.	4-Bromophenyl phenyl ether	5.0
13.	Isophorone	5.0	45.	Hexachlorobenzene	5.0
14.	2-Nitrophenol	5.0	46.	Pentachlorophenol	10.0
15.	2,4-Dimethylphenol	5.0	47.	Phenanthrene	5.0
16.	Bis(2-Chloroethoxy) methane	5.0	48.	Anthracene	5.0
17.	2,4-Dichlorophenol	5.0	49.	Carbazole	5.0
18.	1,2,4-Trichlorobenzene	5.0	50.	Di-n-butyl phthalate	5.0
19.	Naphthalene	5.0	51.	Fluoranthene	5.0
20.	4-Chloroaniline	5.0	52.	Pyrene	5.0
21.	Hexachlorobutadiene	5.0	53.	Butyl benzyl phthalate	5.0
22.	4-Chloro-3-methylphenol	5.0	54.	3,3'-Dichloro benzidine	5.0
23.	2-Methylnaphthalene	5.0	55.	Benz(a)anthracene	5.0
24.	Hexachlorocyclopentadiene	5.0	56.	Chrysene	5.0
25.	2,4,6-Trichlorophenol	5.0	57.	Bis(2-ethylhexyl) phthalate	5.0
26.	2,4,5-Trichlorophenol	10.0	58.	Di-n-octyl phthalate	5.0
27.	2-Chloronapthalene	5.0	59.	Benzo(b)fluoranthene	5.0
28.	2-Nitroananiline	10.0	60.	Benzo(k)fluoranthene	5.0
29.	Dimethyl phthalate	5.0	61.	Benzo(a)pyrene	5.0
30.	Acenaphthylene	5.0	62.	Indeno(1,2,3-cd) pyrene	5.0
31.	2,6-Dinitrotoluene	5.0	63.	Dibenz(a,h) anthracene	5.0
32.	3-Nitroaniline	10.0	64.	Benzo(g,h,i)perylene	5.0

SECTION 3 - ASP ORGANICS (PESTICIDES/PCBS) Method: NYSDEC-ASP-91-3					
	PESTICIDE/PCB	CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)		PESTICIDE/PCB	CONTRACT-REQUIRED QUANTITATION LIMIT (µg/l)
1.	Alpha-BHC	0.05	15.	4,4'-DDT	0.10
2.	Beta-BHC	0.05	16.	Methoxychlor	0.5
3.	Delta-BHC	0.05	17.	Endrin ketone	0.10
4.	Gamma-BHC (lindane)	0.05	18.	Endrin aldehyde	0.10
5.	Heptachlor	0.05	19.	Alpha-Chlordane	0.05
6.	Aldrin	0.05	20.	Gamma-Chlordane	0.05
7.	Heptachlor epoxide	0.05	21.	Toxaphene	5.0
8.	Endosulfan I	0.05	22.	AROCHLOR-1016	1.0
9.	Dieldrin	0.10	23.	AROCHLOR-1221	1.0
10.	4,4'-DDE	0.10	24.	AROCHLOR-1232	1.0
11.	Endrin	0.10	25.	AROCHLOR-1242	1.0
12.	Endosulfan II	0.10	26.	AROCHLOR-1248	1.0
13.	4,4'-DDD	0.10	27.	AROCHLOR-1254	1.0
14.	Endosulfan sulfate	0.10	28.	AROCHLOR-1260	1.0

*Matrix: groundwater. For soil matrix, multiply CRDL by 100.

**Quantitation limit for medium-level soil is 1,200 µg/kg (wet weight basis).

	METHOD: EPA 537/537.1 Perfluorinated Alkyl Acids by Isotope Dilution	Method Detection Limit - Soil (ug/kg)	Method Detection Limit - Groundwater (ug/l)
1	Perfluorobutanoic Acid (PFBA)	0.496	0.002
2	Perfluoropentanoic Acid (PFPeA)	0.496	0.002
3	Perfluorobutanesulfonic Acid (PFBS)	0.496	0.002
4	Perfluorohexanoic Acid (PFHxA)	0.496	0.002
5	Perfluoroheptanoic Acid (PFHpA)	0.496	0.002
6	Perfluorohexanesulfonic Acid (PFHxS)	0.496	0.002
7	Perfluorooctanoic Acid (PFOA)	0.496	0.002
8	1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	0.496	0.002
9	Perfluoroheptanesulfonic Acid (PFHpS)	0.496	0.002
10	Perfluorononanoic Acid (PFNA)	0.496	0.002
11	Perfluorooctanesulfonic Acid (PFOS)	0.496	0.002
12	Perfluorodecanoic Acid (PFDA)	0.496	0.002
13	1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	0.496	0.002
14	N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	0.496	0.002
15	Perfluoroundecanoic Acid (PFUnA)	0.496	0.002
16	Perfluorodecanesulfonic Acid (PFDS)	0.496	0.002
17	Perfluorooctanesulfonamide (FOSA)	0.496	0.002
18	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	0.496	0.002
19	Perfluorododecanoic Acid (PFDoA)	0.496	0.002
20	Perfluorotridecanoic Acid (PFTrDA)	0.496	0.002
21	Perfluorotetradecanoic Acid (PFTA)	0.496	0.002

Appendix E:

Site Management Forms

LOW-FLOW GROUNDWATER SAMPLING LOG

Location:				Job Number:					
Personnel:				Date:					
				PID:	0				
Stickup? Yes Distance ground to Stickup Rim/PVC	Distance From Rim to PVC	Total Depth of Well Rim/PVC	Depth to Product Rim/PVC	Depth to Water (Rim/PVC)	Standing Water Column (feet)	Middle of Saturated Zone (feet)	Depth to Sample Tube (feet)	TOV @ Well Head (ppmv)	Pump Peristaltic or Bladder
Turbidity at collection (NTU):			(Less than 5 NTU is desirable)		Duplicate Collected? Y/N			Filtered Sample Y/N	
Stabilization Parameters		+/- 0.5 deg C.	+/- 0.1 Unit	+/- 10 umhos/cm or within 3% if >300umho	1 ppm	+/- 10 mV	No Limit	<.3 feet drawdown desirable	No Limit

Volume Purged (gallons)	Time (actual Time) 5 minute Intervals	TEMP. (Deg. C)	pH	Specific Conductivity uS/cm	Dissolved Oxygen (mg/L)	ORP mV millivolts	Turbidity NTUs	DTW (feet)	Odors Y/N

Well Condition Summary

Cover: Y / N	Bolts: Y / N		Concrete Pad OK: Y / N	Gripper: Y / N	

Sample Collection Information

Sample Time:		Appearance:	Filtered Sample Turbidity:	OTHER:

Desired purge flow rate <100mL/min (slow drip) & turbidity <10 if possible. If turbidity > 10 collect filtered and unfiltered samples. Notify PM of high turbidity and collection of filtered samples prior to lab submittal. Minimum 20 minute purge to establish stabilization.

Notes/ Calculations:

Volume? Linear Ft of well casing; 1"=0.041 gal. 2"= 0.163 gal. 4"=0.653 gal.

ABSORBENT SOCK

Sock Length (ft) =		Capacity (Qt.) =		Present:	Y / N	Product Measured (Inches) :	
Sock Installation Date:		Sock Changed :			Y / N		
Sock Depth (Depth to sock mid point):							

Air Sampling Data Sheet

VI Sampling Event Date: ______________________ **Weather Conditions:** ______________________

Project: ______________________ **Building HVAC Status:** ______________________

Building Site Address: ______________________ **Sampling Personnel:** ______________________

Sample ID	Sampling Location	Sampling Time		Vacuum (in Hg)		Canister Details	
		Start		Initial		Canister ID #	
		End		Final		Flow Controller #	

Canister Pressure Check

Time							
Vacuum (in Hg)							

Sample Type: Soil-Gas ____ Sub-Slab ____ Indoor ____ Ambient ____ Other ____ **Timeframe:** 24-Hr ____ 8-Hr ____ Grab ____ **Canister Type:** 6L Summa ____ 1L Summa ____ Other ______________

Notes: ______________________ **Sample Height / Depth (ft.):** ______________ **Analytical Method:** TO-15 ____ TO-15 SIM ____ Shortlist ______________

Sample ID	Sampling Location	Sampling Time		Vacuum (in Hg)		Canister Details	
		Start		Initial		Canister ID #	
		End		Final		Flow Controller #	

Canister Pressure Check

Time							
Vacuum (in Hg)							

Sample Type: Soil-Gas ____ Sub-Slab ____ Indoor ____ Ambient ____ Other ____ **Timeframe:** 24-Hr ____ 8-Hr ____ Grab ____ **Canister Type:** 6L Summa ____ 1L Summa ____ Other ______________

Notes: ______________________ **Sample Height / Depth (ft.):** ______________ **Analytical Method:** TO-15 ____ TO-15 SIM ____ Shortlist ______________

Sample ID	Sampling Location	Sampling Time		Vacuum (in Hg)		Canister Details	
		Start		Initial		Canister ID #	
		End		Final		Flow Controller #	

Canister Pressure Check

Time							
Vacuum (in Hg)							

Sample Type: Soil-Gas ____ Sub-Slab ____ Indoor ____ Ambient ____ Other ____ **Timeframe:** 24-Hr ____ 8-Hr ____ Grab ____ **Canister Type:** 6L Summa ____ 1L Summa ____ Other ______________

Notes: ______________________ **Sample Height / Depth (ft.):** ______________ **Analytical Method:** TO-15 ____ TO-15 SIM ____ Shortlist ______________

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

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Appendix F:

Field Sampling Plan

Sonero Metro Auto Site

BRONX, NEW YORK

FIELD SAMPLING PLAN

NYSDEC BCP Site Number: C203148

Prepared for:

Whitlock Point LLC and Whitlock Point Services LLC
5959 Broadway, Suite 3
Bronx, New York 10463

Prepared by:

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Parsippany, NJ 07054
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NOVEMBER 2023

TABLE OF CONTENTS

TABLES

1.0 INTRODUCTION

This document comprises a Field Sampling Plan to be conducted at the Site, as part of the Site Management Plan (SMP). It includes a description of the planned field sampling including sampling methods (groundwater and soil vapor), analytical methods (analytical methods and analytes), and quality assurance procedures. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C203148 which is administered by New York State Department of Environmental Conservation (NYSDEC).

This Site Management Plan (SMP) is a required element of the remedial program for the 108 Main Port Chester Steam Laundry Site located in Port Chester, New York (hereinafter referred to as the "Site"). See Figure 1.1 of the SMP. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C203148, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

Whitlock Point LLC and Whitlock Point Services LLC entered into a Brownfield Cleanup Agreement (BCA) on October 21, 2021 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in Figure 1.2 of the SMP. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A of the SMP.

All previously existing on-Site structures have been demolished. The Site is currently vacant and undergoing construction of a planned redevelopment which entails the construction of a new 14-story residential apartment building.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial, residential and industrial properties. The properties immediately south of the Site include former commercial properties; the properties immediately north of the Site include commercial and industrial properties; the properties immediately east of the Site include Transit Authority properties; and the properties to the west of the Site include residential properties.

2.0 SOIL VAPOR EXTRACTION SAMPLING

2.1 SOIL VAPOR EXTRACTION SAMPLE LOCATIONS

To evaluate the potential for future human exposures from the soil vapor extraction system along the western side of the property, one (1) influent and one (1) effluent sample will be collected from the SVE system before and after the granulated activated carbon (GAC) tower. The sample locations, required analytical parameters and the sampling schedule for soil vapor extraction effluent sampling are provided in **Table 2.1** below. All samples will be sent to an ELAP-certified laboratory for analysis of VOCs in accordance with EPA method TO-15.

Table 2.1 – Soil Vapor Extraction Post Remediation Sampling Requirements and Schedule

Sampling Location	VOC (EPA Method TO-15)	**Schedule**
Influent Vapor Stream	X	Monthly (to transition to quarterly after 3 months)
Effluent		

2.2 SOIL VAPOR EXTRACTION SAMPLING PROTOCOLS

Effluent samples will be collected from each soil vapor extraction point associated with the SVE system. Samples will be collected in 2.7-liter summa canisters that are certified clean by the laboratory. Regulators will be set to collect to a flow rate for a sample duration of 2 hours.

3.0 SOIL VAPOR AND INDOOR AIR SAMPLING

3.1 SOIL VAPOR AND INDOOR AIR SAMPLE LOCATIONS

To evaluate the potential for future human exposures from vapor intrusion into the proposed buildings, Five (5) soil vapor and five (5) co-located indoor air (IA) samples will be collected in the area of the installed sub-slab depressurization system (SSDS). The sample locations are shown on **Figure V-2** of the SMP. The sample locations, required analytical parameters and the sampling schedule for indoor air sampling are provided in **Table 3.1** below. All samples will be sent to an ELAP-certified laboratory for analysis of VOCs in accordance with EPA method TO-15.

Table 3.1 – Soil Vapor Intrusion Sampling Requirements and Schedule

Sub-Slab Vapor Point ID	Location	Analytical Parameters	Schedule
SV-1	Soil Vapor	VOCs by TO-15	Will be sampled once during the heating season and prior to building occupancy
SV-2	Soil Vapor		
SV-3	Soil Vapor		
SV-4	Soil Vapor		
SV-5	Soil Vapor		
IA-1	Indoor Air		
IA-2	Indoor Air		
IA-3	Indoor Air		
IA-4	Indoor Air		
IA-5	Indoor Air		
AA-1	Ambient Air		

3.2 SOIL VAPOR AND INDOOR AIR SAMPLING PROTOCOLS

Soil vapor will be collected from vapor sample ports associated with the SSDS. Indoor air samples will be co-located with soil vapor points and placed at a height of at least 3-feet above the slab. Samples will be collected in 2.7-liter or 6-liter summa canisters that are certified clean by the laboratory. Regulators will be set to collect to a flow rate for a sample duration of 2 hours.

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Appendix G:

Health and Safety Plan

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Sonero Metro City Auto Site
1001 Whitlock Avenue
Bronx, Bronx County, New York
BCP# C203148

Prepared For:

Whitlock Point LLC and Whitlock Point Services LLC
5959 Broadway, Suite 3
Bronx, NY 10459

Prepared By:

SESI CONSULTING ENGINEERS
959 Route 46E, Floor 300 Suite 3
Parsippany, NJ 07054

Project No.: 11819

MAY 2022
REVISED AUGUST 2023

Disclaimer: *This Health and Safety Plan (HASP) is based upon information provided [and, if applicable, conditions discovered during a site visit], and is limited by the project scope.*

The HASP should be periodically reviewed and updated based on a number of factors, including but not limited to: (1) changes in applicable governmental requirements; (2) changes in procedures at the site; and (3) site conditions which were unknown to SESI Consulting Engineers (SESI) as of the time the HASP was prepared.

This HASP has been prepared for the sole and exclusive use of Whitlock Point LLC and may not be relied upon by any other person without the express written consent and authorization of SESI.

SITE-SPECIFIC HEALTH AND SAFETY PLAN

For

Sonero Metro City Auto Site
1001 Whitlock Avenue
Bronx, New York 10459
BCP# C203148

Prepared by: _____ Date: 11/01/23

_____

Jesse Mausner
SESI- Senior Project Manager

Approved by: _____ Date: 11/01/23

_____

Fuad Dahan
SESI-Principal

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LIST OF EMBEDDED TABLES

LIST OF ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
COC	Constituent(s) of Concern
CRZ	Contamination Reduction Zone
EZ	Exclusion Zone
FS	Field Supervisor
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan
HSM	Health and Safety Manager
LEL	Lower Explosive Limit
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PM	Project Manager
PO	Project Officer
PPE	Personal Protective Equipment
SESI	SESI Consulting Engineers
SSO	Site Safety Officer
SVOC	Semi-Volatile Organic Compound
SZ	Support Zone
TLV	Threshold Limit Value
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

HEALTH AND SAFETY PLAN SUMMARY

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site Chemicals of Concern (COCs). COCs at the site include metals, some VOC compounds, some SVOC compounds and some pesticides. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations.

The potential for inhalation of site COCs is low. The potential for dermal contact with soils containing site COCs during remedial operations is moderate.

The following table summarizes airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

Parameter	Reading	Action
Dust	0 to .5 mg/m^3	Normal operations
	0.5 to 1 mg/m^3	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 1 mg/m^3	Stop work, fully implement dust control plan
Oxygen	$\leq$ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	$\geq$ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to $\leq$ 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the Field Supervisor and Site Safety Officer. The following table presents a selection matrix to determine appropriate Personal Protective Equipment.

Task	Anticipated Level of Protection
Mobilization	Level D
Subsurface Intrusive Activities (Mass Excavation, Drilling, Soil Grouting)	Modified Level D/Level C
Earthwork/Grading	Level D
Additional Chemical Sampling / Delineation	Modified Level D/Level C
Decontamination	Modified Level D
Demobilization	Level D

1.0 INTRODUCTION

1.1 Objective

The objective of this Health and Safety Plan (HASP) is to provide a mechanism for establishing safe working conditions during activities at the Sonero Metro City Auto Site located at 1001 Whitlock Avenue, Bronx, Bronx County, New York (the Site). The safety organization, procedures, and protective equipment have been established based on an analysis of potential physical, chemical, and biological hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of injury, illness, or other hazardous incidents.

The HASP was written to meet the requirements of all applicable Federal, State, and local health and safety regulations, including 29 CFR 1910.120. The HASP is based on current knowledge regarding the specific chemical and physical hazards that are known or anticipated at the Site. This HASP is a dynamic document, for which changes and/or revisions may be realized as changes in scope and/or site conditions are encountered. Should revised documents be produced, said revised documents will refer to the specific changes and why they were made.

1.2 Site and Facility Description

The Site is located at 1001 Whitlock Avenue, Bronx, New York (the “Site”). The Site consists of approximately 0.788-acres. The Site is identified on the tax map as tax parcel Block 2756, Lot 85.

The Site is an area characterized by a mix of residential, commercial, industrial, and manufacturing developments. The Site is bounded by an industrial building to the north, Aldus Street to the south, Whitlock Avenue to the east, and Longfellow Avenue to the west. There are no surface water bodies or streams on or directly adjacent to the Site. SESI did not observe any areas suspected to be wetlands on the Site. Storm water drainage patterns are generally consistent with the surrounding topography and primarily flow to the north. The topographic map indicates that the topography at the Site is in a northerly direction.

1.3 Policy Statement

The policy of SESI Consulting Engineers (SESI) is to provide a safe and healthful work environment. No aspect of operations is of greater importance than injury and illness prevention. A fundamental principle of safety management is that all injuries, illnesses, and incidents are preventable. SESI will take every reasonable step to eliminate or control hazards in order to minimize the possibility of injury, illness, or incident.

This HASP prescribes the procedures that must be followed by SESI personnel during activities at the site. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Health and Safety Manager (HSM). This document will be reviewed periodically by the HSM to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification to this HASP. Such changes will be completed in the form of an addendum or a revision to the plan.

The provisions of this plan are mandatory for all SESI personnel and are advisory for all contractors, and subcontractors assigned to the project***. Subcontractors will be responsible for preparing their own site-specific HASPs that meet the basic requirements outlined in this HASP.*** All visitors to SESI work areas at the site must abide by the requirements of this plan.

1.4 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and SESI health and safety policies and procedures. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, OSHA, USCG, USEPA (86116, October 1985).
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1910.
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, DHHS, PHS, CDC, NIOSH (2004).
- *Threshold Limit Values*, ACGIH (2005).
- *Guide to Occupational Exposure Values*, ACGIH (2005).
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

1.5 Definitions

The following definitions (listed alphabetically) are applicable to this HASP:

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be present, and pose an exposure hazard to on-site personnel.
- *Incident* - All losses, including first aid cases, injuries, illnesses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *On-Site Personnel* - All SESI and subcontractors involved with the project.
- *Project* - All on-site work performed under the scope of work.
- *Site* - The area described in Section 1.2, Site and Facility Description, where the work is to be performed by SESI personnel and subcontractors.
- *Support Zone (SZ)* - All areas of the site except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Subcontractor* - Includes contractor personnel hired by SESI.
- *Visitor* - All other personnel, except the on-site personnel.
- *Work Area* - The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area on the site that is not contaminated, or suspected of being contaminated, the entire work area may be a SZ.

2.0 PROJECT SCOPE OF WORK

This HASP contains information for the following tasks that SESI is anticipated to conduct at the Site. Should additional and/or different tasks be identified, amendments to this HASP will be required to address these changed items.

- Mobilization;
- Soil Vapor Extraction system sampling, operation, and maintenance;
- Soil Vapor Sampling
- Installation of a Vapor Barrier for the Building;
- Decontamination and Demobilization.

3.0 ROLES AND RESPONSIBILITIES

3.1 All Personnel

All SESI project personnel must adhere to the procedures outlined in this HASP during the performance of their work. Each person is responsible for completing tasks safely and reporting any unsafe acts or conditions to their supervisor. No person may work in a manner that conflicts with these procedures. After due warnings, the PM will dismiss from the site any SESI employee or subcontractor who violates safety procedures.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all SESI personnel will attend an initial hazard briefing prior to beginning work at the site.

The roles of key safety personnel and subcontractors are outlined in the following sections. Key project personnel and contacts are summarized in **Table 1** on page 7.

3.2 Key Safety Personnel

3.2.1 Project Officer (PO)

The PO is responsible for providing resources to assure project activities are completed in accordance with this HASP, and for meeting all regulatory and contractual requirements.

3.2.2 Project Manager (PM)

The PM is responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The PM is responsible for confirming that the Field Supervisor (FS) has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that subcontractors assigned to this project meet the requirements established by SESI. It is also the responsibility of the PM to:

- Consult with the HSM on site health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;
- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications of this HASP; and

- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

3.2.3 Health and Safety Manager (HSM)

The HSM or their designee, the health and safety manager (HSM), has overall responsibility for the technical health and safety aspects of the project, including review and approval of this HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSM or their designee must approve changes or addenda to this HASP.

3.2.4 Site Safety Officer (SSO)

The SSO is responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The SSO will advise the PM on health and safety issues and will establish and coordinate the project air-monitoring program if one is deemed necessary (see Section 5.1, Air Monitoring). The SSO is the primary site contact on health and safety matters. It is the responsibility of the SSO to:

- Provide on-site technical assistance, if necessary;
- Participate in all accident/incident reports and ensure that they are reported to the HSM, client, and PM within 24 hours;
- Coordinate site and personal air monitoring as required, including equipment maintenance and calibration;
- Conduct site safety orientation training and safety meetings;
- Verify that project personnel have received the required physical examinations and medical certifications;
- Review site activities with respect to compliance with this HASP;
- Maintain required health and safety documents and records; and
- Assist the FS in instructing field personnel on project hazards and protective procedures.

3.2.5 Field Supervisor (FS)

The FS is responsible for implementing this HASP, including communicating requirements to on-site personnel and subcontractors. The FS will be responsible for informing the PM of changes in the work plan, procedures, or site conditions so that those changes may be addressed in this HASP. Other responsibilities are to:

- Consult with the SSO on site health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map and determine and post routes to medical facilities and emergency telephone numbers;
- Notify local public emergency representatives (as appropriate) of the nature of the site operations, and post their telephone numbers (i.e., local fire department personnel who would respond for a confined space rescue);
- Observe on-site project personnel for signs of ill health effects;
- Investigate and report any incidents to the SSO;
- Verify that all on-site personnel have had applicable training;

- Verify that on-site personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control the hazards; and
- Issue/obtain any required work permits (hot work, confined space, etc.).

3.2.6 Field Personnel (FP)

All SESI field personnel are responsible for following the Health and Safety procedures specified in this HASP and work practices specified in applicable operation procedures. Some specific responsibilities include, but are not limited to:

- Reading and understanding the HASP;
- Reporting all accidents, incidents, injuries, or illnesses to the FS;
- Complying with the requests of the SSO;
- Immediately communicating newly identified hazards or noncompliance issues to the FS or SSO; and
- Stopping work in cases of immediate danger.

3.3 Subcontractors

Subcontractors and their personnel must understand and comply with applicable regulations and site requirements established in this HASP. Subcontractors will prepare their own site-specific HASP that must be consistent with the requirements of this HASP.

All subcontractor personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. All subcontractor personnel will attend an initial hazard briefing prior to beginning work at the site. Additionally, on-site subcontractor personnel must conduct daily site safety meetings.

Subcontractors must designate individuals to function as the PM, HSM, SSO, and FS. In some firms the HSM to be carried out by the PM. This is acceptable provided the PM has the required knowledge, training, and experience to properly address all hazards associated with the work, and to prepare, approve, and oversee the execution of the site-specific HASP. A subcontractor may designate the same person to perform the duties of both the SSO and the FS. However, depending on the level of complexity of a contractor's scope of work, it may be infeasible for one person to perform both functions satisfactorily.

3.4 Stop Work Authority

Every SESI employee and subcontractor is empowered, expected, and has the responsibility to stop the work of another co-worker if the working conditions or behaviors are considered unsafe.

3.5 All On-Site Personnel

All on-site SESI personnel (including SESI subcontractors) must read and acknowledge their understanding of their respective HASPs before commencing work and abide by the requirements of the plans. All on-site SESI personnel shall sign their HASP Acknowledgement Form following their review of their HASP.

All SESI project personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all on-site personnel will attend an initial hazard

briefing provided by the SSO prior to beginning work at the site and conduct daily safety meetings thereafter.

On-site personnel will immediately report the following to the FS or SSO:

- Personal injuries and illnesses no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or hazardous situations;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property; and
- Situations or activities for which they are not properly trained.

3.6 Visitors

All SESI personnel and subcontractors visiting the Site must check in with the FS. Visitors will be cautioned to avoid skin contact with surfaces, soils, groundwater, or other materials that may impacted or be suspected to be impacted by constituents of concern (COCs).

Visitors requesting to observe work at the site must don appropriate personal protective equipment (PPE) prior to entry to the work area and must have the appropriate training and medical clearances to do so. If respiratory protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit tested for a respirator within the past 12 months.

Table 1 – Key Safety Personnel

SESI Personnel		
Role	**Name**	**Telephone No.**
Project Principal	Fuad Dahan, P.E., PhD	973-808-9050 x249
Project Manager (PM)	Jesse Mausner, P.G.	973-808-9050 x282
Principal Engineer	Fuad Dahan, P.E., PhD	973-808-9050 x249
Remedial Action Project Manager	Chris Malvicini	973-808-9050
Field Team Leader	Shannon Grogan	973-808-9050
Quality Assurance Officer	Joe Scardino	973-808-9050 x267
Field Personnel	TBD	

4.0 PERSONAL PROTECTIVE EQUIPMENT

4.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the levels of COCs and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in **Table 2** on page 10.

4.1.1 Level D Protection

The minimum level of protection that will be required of project personnel at the site will be Level D, which will be worn when site conditions or air monitoring indicates no inhalation hazard exists. The following equipment will be used:

- Work clothing as prescribed by weather;
- Steel toe work boots, meeting American National Standards Institute (ANSI) Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Leather work gloves and/or nitrile surgical gloves;
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

4.1.2 Modified Level D Protection

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of:

- Nitrile gloves worn over nitrile surgical gloves;
- Latex/polyvinyl chloride (PVC) overboots when contact with COC-impacted media is anticipated;
- Steel toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist (e.g. during Power Washing activities);
- Hard hat, meeting ANSI Z89, when falling object hazards are present;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used);
- Tyvek® suit (polyethylene coated Tyvek® suits for handling liquids) when body contact with COC-impacted media is anticipated; and
- PFD if working on or near the water.

4.1.3 Level C Protection

Level C protection will be required when the airborne concentration of COC reaches one-half of the OSHA Permissible Exposure Limit or ACGIH TLV. The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with combination organic vapor/HEPA cartridges;
- Polyethylene-coated Tyvek® suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots, meeting ANSI Z41;
- Chemical-resistant boots with steel toes or latex/PVC overboots over steel toe boots;
- Hard hat, meeting ANSI Z89;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used); and
- PFD if working on or near the water.

4.2 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising site personnel and health and safety professionals. The PPE used will be chosen to be effective against the COCs present on the site.

4.3 Site Respiratory Protection Program

Respiratory protection is an integral part of employee health and safety at the site due to potentially hazardous concentrations of airborne COCs. The site respiratory protection program will consist of the following (as a minimum):

- All on-site personnel who may use respiratory protection will have an assigned respirator.
- All on-site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-face air-purifying respirator within the past 12 months. Documentation of the fit test must be provided to the SSO prior to commencement of work.
- All on-site personnel who may use respiratory protection must within the past year have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SSO, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn when a respirator is worn.
- All on-site personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

4.4 Using PPE

Depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Modified Level D or Level C PPE is used. All personnel entering the EZ must put on the required PPE in accordance with the requirements of this HASP. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of COCs.

4.4.1 Donning Procedures

These procedures are mandatory only if Modified Level D or Level C PPE is used on the site:

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on work clothes or coveralls;

- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;
- Don the required respirator and perform appropriate fit check (Level C);
- Put hood or head covering over-head and respirator straps and tape hood to facepiece (Level C); and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

4.4.2 Doffing Procedures

The following procedures are only mandatory if Modified Level D or Level C PPE is required for the site. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments, equipment, and respirator (Level C). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face, and neck (or shower if necessary);
- Proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal. See Section 7, Decontamination, for detailed information on decontamination stations.

4.5 Selection Matrix

The level of personal protection selected will be based on air monitoring of the work environment and an assessment by the FS and SSO of the potential for skin contact with COCs. The PPE selection matrix is presented in **Table 2** below. This matrix is based on information available at the time this plan was written. The Airborne Contaminant Action Levels in **Table 3** on page 12, Airborne Contaminant Action Levels, should be used to verify that the PPE prescribed in these matrices is appropriate.

Table 2 – PPE Selection Matrix

Task	Anticipated Level of Protection
Mobilization	Level D
Subsurface Intrusive Activities (Excavation, Drilling)	Modified Level D/Level C
Earthwork/Grading	Level D
Chemical Sampling / Delineation	Modified Level D/Level C
Decontamination	Modified Level D
Demobilization	Level D

5.0 AIR AND NOISE MONITORING

5.1 Air Monitoring

Air monitoring, sampling, and testing will be conducted to determine employee exposure to airborne constituents. The monitoring results will dictate work procedures and the selection of PPE. The SESI SSO will be responsible for defining appropriate air monitoring procedures and for utilizing the air monitoring results to determine appropriate procedures and PPE for project personnel. Air monitoring results should be recorded in field notebooks or on an air monitoring log (see Attachment 1 for a copy of the Air Monitoring Log). Any deviations from the procedures listed here should be documented and explained in the Air Monitoring Log.

The monitoring devices to be used are a PDR1000 particulate monitor (or equivalent) and a Rae Systems MultiRAE detector (PID with a 11.7 eV lamp/oxygen/LEL/hydrogen sulfide sensors). Colorimetric detector tubes may be utilized to estimate airborne concentrations of benzene and should be onsite during any activities that may result in elevated PID readings including drilling, excavating, and groundwater sampling.

Air monitoring will be conducted continuously with the LEL/Oxygen meter during drilling in areas where flammable vapors or gases are suspect. All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the LEL at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

5.2 Noise Monitoring

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

5.3 Monitoring Equipment Maintenance and Calibration

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented on a calibration log or in the field notebook. All completed health and safety documentation/forms must be reviewed by the SSO and maintained by the FS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturer's procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSO must be responsible for immediately removing the instrument from

service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The SSO will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

5.4 Action Levels

Table 3 below presents airborne contaminant action levels that will be used to determine the procedures and protective equipment necessary based on conditions as measured at the site.

Table 3 – Airborne Contaminant Action Levels

Parameter	Reading	Action
Total Hydrocarbons	0 ppm to ≤ 1 ppm	Normal operations; continue hourly breathing zone monitoring
	> 1 ppm to 5 ppm	Increase monitoring frequency to every 15 minutes and use benzene detector tube to screen for the presence of benzene
	≥ 5 ppm to ≤ 50 ppm	Upgrade to Level C PPE; continue screening for benzene
	> 50 ppm	Stop work; investigate cause of reading
	At any reading > 5 ppm	Monitor perimeter per CAMP
Benzene	≥ 1 ppm to 5 ppm	Upgrade to Level C PPE
	> 5 ppm	Stop work; investigate cause of reading
Dust	0 to .05 mg/m^3	Normal operations
	0.05 to 0.1 mg/m^3	Begin soil wetting procedure (Level C protection would be needed beyond this point)
	> 0.15 mg/m^3	Stop work, fully implement dust control plan
Oxygen	≤ 19.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
	> 19.5% to < 23.5%	Normal operations
	≥ 23.5%	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Carbon Monoxide	0 ppm to ≤ 20 ppm	Normal operations
	> 20 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Hydrogen Sulfide	0 ppm to ≤ 5 ppm	Normal operations
	> 5 ppm	Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Flammable Vapors (LEL)	< 10% LEL	Normal operations
	≥ 10% LEL	Stop work, ventilate area, investigate source of vapors

6.0 WORK ZONES AND DECONTAMINATION

6.1 Work Zones

6.1.1 Authorization to Enter

Only personnel with the appropriate training and medical certifications (if respirators are required) will be allowed to work at the project site. The FS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the site work areas.

6.1.2 Site Orientation and Hazard Briefing

No person will be allowed in the work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the FS or SSO and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Following this initial meeting, daily safety meetings will be held each day before work begins.

All people entering the site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings on the forms included with this plan.

6.1.3 Certification Documents

A training and medical file may be established for the project and kept on site during all site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all project field personnel required to wear respirators, will be maintained within that file. All project personnel must provide their training and medical documentation to the SSO prior to starting work.

6.1.4 Entry Log

A log-in/log-out sheet will be maintained at the site by the FS. Personnel must sign in and out on a log sheet as they enter and leave the work area, and the FS may document entry and exit in the field notebook.

6.1.5 Entry Requirements

In addition to the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any SESI work area unless they are wearing the minimum PPE as described in Section 4.0.

6.1.6 Emergency Entry and Exit

People who must enter the work area on an emergency basis will be briefed of the hazards by the FS or SSO. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a designated safe area for a head count. The FS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

6.1.7 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

6.1.8 Exclusion Zone (EZ)

An EZ may consist of a specific work area or may be the entire area of potential contamination. All employees entering an EZ must use the required PPE and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or a posted site diagram will identify the location of each EZ.

6.1.9 Contamination Reduction Zone

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the support zone (SZ) discussed below.

6.1.10 Support Zone (SZ)

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to site requirements.

6.1.11 Posting

Work areas will be prominently marked and delineated using cones, caution tape, or a posted site diagram.

6.1.12 Site Inspections

The FS will conduct a daily inspection of site activities, equipment, and procedures to verify that the required elements are in place.

6.2 Decontamination

6.2.1 Personnel Decontamination

All personnel wearing Modified Level D or Level C protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- *Station 1*: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.
- *Station 2*: Personnel will remove their outer garment and gloves and dispose of it in properly labeled containers. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand carried to the next station.
- *Station 3*: Personnel will thoroughly wash their hands and face before leaving the CRZ. Respirators will be sanitized and then placed in a clean plastic bag.

6.2.2 Equipment Decontamination

All vehicles that have entered the EZ will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination

may be limited to rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

6.2.3 Personal Protective Equipment Decontamination

Where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves, and covers must be thoroughly cleaned at the end of each work shift, and ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water (mixed at 2% bleach by volume), or by using a spray disinfectant

7.0 TRAINING AND MEDICAL SURVEILLANCE

7.1 Training

7.1.1 General

All on-site project personnel who work in areas where they may be exposed to site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of the project must have completed an eight-hour refresher course within the past 12 months. The FS must have completed an additional eight hours of supervisory training and must have a current first-aid/CPR certificate (See Attachment 2).

7.1.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour HAZWOPER training course:

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment on site;
- Medical surveillance requirements;
- Recognition of symptoms and signs which might indicate overexposure to hazards;
- Worker right-to-know (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;
- Confined-space entry procedures; and

- General emergency response procedures.

7.1.3 Supervisor Course

Management and supervisors must receive an additional eight hours of training, which typically includes:

- General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

7.1.4 Site-Specific Training

Site-specific training will be accomplished by on-site personnel reading this HASP, and through a thorough site briefing by the PM, FS, or SSO on the contents of this HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures.

7.1.5 Daily Safety Meetings

Daily safety meetings will be held to cover the work to be accomplished, the hazards anticipated, the PPE and procedures required to minimize site hazards, and emergency procedures. The FS or SSO should present these meetings prior to beginning the day's fieldwork. No work will be performed in an EZ before a daily safety meeting has been held. An additional safety meeting must also be held prior to new tasks, or if new hazards are encountered. The daily safety meetings will be logged in the field notebook.

7.1.6 First Aid and CPR

At least one employee current in first aid/CPR will be assigned to the work crew and will be on the site during operations. Site records will document the presence of this individual. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

7.2 Medical Surveillance

7.2.1 Medical Examination

All personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1910.120 (f).

7.2.2 Pre-placement Medical Examination

All potentially exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable regulations. The pre-placement and periodic medical examinations typically include the following elements:

- Medical and occupational history questionnaire;
- Physical examination;
- Complete blood count, with differential;
- Liver enzyme profile;

- Chest X-ray, at a frequency determined by the physician;
- Pulmonary function test;
- Audiogram;
- Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- Drug and alcohol screening, as required by job assignment;
- Visual acuity; and
- Follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

7.2.3 Other Medical Examinations

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- At employee request after known or suspected exposure to toxic or hazardous materials; and
- At the discretion of the SSO, HSM, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials.

7.2.4 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 24 months.

7.2.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the SSO. The terms of the restriction will be discussed with the employee and the supervisor.

8.0 GENERAL SAFETY PRACTICES

8.1 General Safety Rules

General safety rules for site activities include, but are not limited to, the following:

- At least one copy of this HASP must be in a location at the site that is readily available to personnel, and all project personnel shall review the plan prior to starting work.
- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and ensure closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by COCs, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COCs must be reported to the FS or SSO immediately. If needed, medical attention should be sought.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by COCs, such as standing water, mud, or discolored soil. Equipment must be stored on elevated or protected surfaces to reduce the potential for incidental contamination.
- Remove PPE as required in the CRZ to limit the spread of COC-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Removing soil containing site COCs from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited.
- Inspect all non-disposable PPE for contamination in the CRZ. Any PPE found to be contaminated must be decontaminated or disposed of appropriately.
- Recognize emergency signals used for evacuation, injury, fire, etc.
- Report all injuries, illnesses, and unsafe conditions or work practices to the FS or SSO.
- Use the “buddy system” during all operations requiring Level C PPE, and when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.
- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer’s directions.
- Personnel are to perform only tasks for which they have been properly trained and will advise their supervisor if they have been assigned a task for which they are not trained.
- The presence or consumption of alcoholic beverages or illicit drugs during the workday, including breaks, is strictly prohibited. Notify your supervisor if you must take prescription or over-the-counter drugs that indicate they may cause drowsiness or, that you should not operate heavy equipment.
- Remain upwind during site activities whenever possible.

8.2 Buddy System

On-site personnel must use the buddy system as required by operations. Use of the "buddy system" is required during all operations requiring Level C to Level A PPE, and when appropriate, during Level D operations. Crewmembers must observe each other for signs of chemical exposure, and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Crewmembers must also be aware of the potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

8.3 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

8.4 Heat Stress Safety Precautions

Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in **Table 4** below.

Table 4 – Work/Rest Schedule

Adjusted Temperature[b]	Work/Rest Regimen Normal Work Ensemble[c]	Work/Rest Regimen Impermeable Ensemble
90ºF (32.2ºC) or above	After each 45 minutes of work	After each 15 minutes of work
87.5º - 90ºF (30.8º-32.2ºC)	After each 60 minutes of work	After each 30 minutes of work
82.5º - 87.5ºF (28.1º - 30.8ºC)	After each 90 minutes of work	After each 60 minutes of work
77.5º - 82.5ºF (25.3º - 28.1ºC)	After each 120 minutes of work	After each 90 minutes of work
72.5º - 77.5ºF (30.8º - 32.2ºC)	After each 150 minutes of work	After each 120 minutes of work

a. For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)
b. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
c. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
d. The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

In order to determine if the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-site drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.

- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

8.5 Cold Stress

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at 18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in **Table 5** below.

Table 5 – Wind Chill Temperature Chart

Estimated Wind Speed (in mph)	**Actual Temperature Reading (ºF)**											
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**	**-50**	**-60**
	Equivalent Chill Temperature (ºF)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	**LITTLE DANGER Maximum danger of false sense of security.**				**INCREASING DANGER Danger from freezing of exposed flesh within one minute.**			**GREAT DANGER Flesh may freeze within 30 seconds.**				
	Trench foot and immersion foot may occur at any point on this chart.											

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by sudden blanching or whitening of skin.
- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

8.6 Safety Precautions for Cold Stress Prevention

For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.

At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.

If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must ensure that their clothing is not wet as a consequence of sweating. Wet field personnel must change into dry clothes prior to entering the cold area.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

8.7 Safe Work Practices

Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.

For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.

Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing. Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

8.8 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, spiders, and other pests.

8.8.1 Tick Borne Diseases

Lyme Disease - The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

Erlichiosis - The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever (RMSF) - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (Rickettsia rickettsii) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

Control - Tick repellant containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

8.8.2 Poisonous Plants

Poisonous plants may be present in the work area. Personnel should be alerted to its presence and instructed on methods to prevent exposure.

Control - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water and observed for signs of reddening.

8.8.3 Snakes

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control - To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snakebite occurs, an attempt should be made to safely identify the snake via size and markings. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

8.8.4 Spiders

Personnel may encounter spiders during work activities.

Two spiders are of concern, the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately one inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widows body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. The brown recluse has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful and the bite site ulcerates and takes many weeks to heal completely.

Control - To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs, and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest

hospital as soon as possible; first aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

8.9 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

Control - All personnel must wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 5.2, Noise Monitoring.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

8.10 Spill Control

All personnel must take every precaution to minimize the potential for spills during site operations. All on-site personnel shall immediately report any discharge, no matter how small, to the FS.

Spill control equipment and materials will be located on the site at locations that present the potential for discharge. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. In the event of a spill, the FS will follow the provisions in Section 10.0, Emergency Procedures, to contain and control released materials and to prevent their spread to off-site areas.

8.11 Sanitation

Site sanitation will be maintained according to OSHA requirements.

8.11.1 Break Area

Breaks must be taken in the SZ, away from the active work area after site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

8.11.2 Potable Water

The following rules apply to all field operations:

- An adequate supply of potable water will be provided at each project site. Potable water must be kept away from hazardous materials or media, and contaminated clothing or equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed and must be equipped with a tap dispenser. Water must not be consumed directly from the container (drinking from the tap is prohibited) nor may it be removed from the container by dipping.

- Containers used for drinking water must be clearly marked and shall not be used for any other purpose.
- Disposable drinking cups must be provided. A sanitary container for dispensing cups and a receptacle for disposing of used cups is required.

8.11.3 Sanitary Facilities

Access to facilities for washing before eating, drinking, or smoking, or alternate methods such as waterless hand-cleaner and paper towels will be provided.

8.11.4 Lavatory

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided. This requirement does not apply to mobile crews or to normally unattended site locations so long as employees at these locations have transportation immediately available to nearby toilet facilities.

8.12 Emergency Equipment

Adequate emergency equipment for the activities being conducted on site and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 will be on site prior to the commencement of project activities. Personnel will be provided with access to emergency equipment, including, but not limited to, the following:

- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926;
- Industrial first aid kits of adequate size for the number of personnel on site; and
- Emergency eyewash and/or shower if required by operations being conducted on site.

8.13 Lockout/Tagout Procedures

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins, lockout/tagout procedures per OSHA 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system shall be used. Tagout is the placement of a warning tag on an energy or material isolating device indicating that the equipment controls may not be operated until the personnel who attached the tag remove the tag.

8.14 Electrical Safety

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.

- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

8.15 Lifting Safety

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.

- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

8.16 Ladder Safety

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

- Ladders shall be maintained free of oil, grease, and other slipping hazards.
- Ladders shall not be loaded beyond the maximum intended load for which they were built, or beyond their manufacturer's rated capacity.
- Ladders shall be used only for the purpose for which they were designed.
- Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).
- Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.
- Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.
- Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.
- Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
- Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.
- The area around the top and bottom of ladders shall be kept clear.
- The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.
- Ladders shall not be moved, shifted, or extended while occupied.
- Ladders shall have non-conductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.
- The top, top step, or the step labeled that it or any step above it should not be used as a step.
- Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders shall be inspected by the HSM for visible defects on a daily basis and after any occurrence that could affect their safe use.

- Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components shall either be immediately marked in a manner that readily identifies them as defective or be tagged with “Do Not Use” or similar language and shall be withdrawn from service.
- Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; or corroded components; shall be withdrawn from service.
- Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.
- Single-rail ladders shall not be used.
- When ascending or descending a ladder, the user shall face the ladder.
- Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- An employee shall not carry any object or load that could cause the employee to lose balance and fall.

8.17 Traffic Safety

The project site may be located adjacent to a public roadway where exposure to vehicular traffic is likely. Traffic may also be encountered as vehicles enter and exit the area. To minimize the likelihood of project personnel and activities being affected by traffic, the following procedures will be implemented.

Cones must be placed along the shoulder of the roadway starting 100 feet from the work area to alert passing motorists to the presence of personnel and equipment. A “Slow” or “Men Working” sign must be placed at the first cone. Barricades with flashing lights should be placed between the roadway and the work area.

During activities along a roadway, equipment will be aligned parallel to the roadway to the extent feasible, facing into the oncoming traffic so as to place a barrier between the work crew and the oncoming traffic. All crewmembers must remain behind the equipment and the traffic barrier.

All site personnel who are potentially exposed to vehicular traffic must wear an outer layer of orange warning garments, such as vests, jackets, or shirts. If work is performed in hours of dusk or darkness, workers will be outfitted with reflective garments either orange, white (including silver-coated reflective coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

The flow of traffic into and out of the adjacent business must be assessed, and precautions taken to warn motorists of the presence of workers and equipment. Where possible, vehicles should be aligned to provide physical protection of people and equipment.

9.0 SITE-SPECIFIC HAZARDS AND CONTROL MEASURES

9.1 Evaluation of Hazards

The evaluation of hazards is provided as a quick reference as to the known conditions for the Site, wherein the level of detail for each of the subsections is identified.

9.1.1 Hazard Characteristics

Existing information for Site:
__X__ Detailed _____ Preliminary _____ None

Hazardous/Contaminated Material Form(s):
__X__ Solid __X__ Liquid _____ Sludge ___ Gas X Vapor

Containment Type(s):
_____ Drum __X__ Tank _____ Pit __X__ Debris
_____ Pond _____ Lagoon Other:

Hazardous Material Characteristics:
__X__ Volatile _____ Corrosive _____ Reactive _____ Radioactive
_____ Ignitable __X__ Toxic __X__ Unknown

Routes of Exposure:
__X__ Oral __X__ Dermal __X__ Eye __X__ Respiratory

9.1.2 Potential Health and Safety Hazards

__X__ Heat
__X__ Cold
_____ Confined space entry
_____ Oxygen depletion
_____ Asphyxiation
__X__ Excavation
__X__ Cave-ins
__X__ Falls, slippage
__X__ Heavy equipment
_____ Other: Potential Ignition Hazard.

_____ Congested areas
__X__ General Construction
__X__ Physical injury
__X__ Electrical hazards
__X__ Handling and product transfer
__X__ Fire
__X__ Explosion
__X__ Biological Hazards
- __X__ Plants – Poison Ivy, Poison Oak
- __X__ Insects – Ticks
- __X__ Insects – Mosquitoes
- __X__ Insects – Bees and Wasps
- __X__ Rats and Mice

_____ Non-ionizing Radiation (i.e. UV, IR, etc.)

9.2 Field Activities, Hazards, and Control Procedures

The following task-specific safety analyses identify potential health, safety, and environmental hazards associated with each type of field activity. Because of the complex and changing nature of field projects, supervisors must continually inspect the site to identify hazards that may affect on-site personnel, the community, or the environment. The FS must be aware of these changing conditions and discuss them with the PM whenever these changes impact employee health, safety, the environment, or performance of the project. The FS will keep on-site personnel informed of the changing conditions, and the PM will write and/or approve addenda or revisions to this HASP as necessary.

9.2.1 Mobilization/Construction Stakeout

Description of Tasks

Site mobilization will include establishing excavation locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The hazards of this phase of activity are associated with heavy equipment operation, manual materials handling, installation of temporary on-site facilities, and manual site preparation.

Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Installation of temporary field office and support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to the manual lifting and moving of materials. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat- or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Controls

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

9.2.2 Demolition/Site Clearing

Description of Tasks

Site clearance will involve manual or mechanical removal of objects impeding access to the construction footprint. These obstructions are both natural and man-made items and will include, but not be limited to, fabricated metal and concrete structures, trees, vegetation, rubble, and miscellaneous trash/debris.

Hazard Identification

Hazards associated with demolition and site clearance include personnel working in and around potentially unstable structures, or locations of potential contact with hazardous chemicals, utilities, and/or falling objects. This task will involve manual, as well as mechanical demolition/clearance efforts so exertion and equipment hazards exist.

Controls

PPE – Personnel shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

Preparatory Operations – Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a licensed Professional Engineer, of the structure to

determine the stability of the structure. Any adjacent structure shall where personnel may be exposed shall also be similarly checked. The PO shall have in writing evidence that such a survey has been performed. All structural instabilities shall be shored or braced, under the supervision of a licensed Professional Engineer, prior to access by an FP.

Utilities – All electric, gas, water, steam, sewer, and other service lines shall be shut off, caped, or otherwise controlled, outside the building line before demolition work is started. In each case, any utility company that is involved shall be notified in advance. If it is necessary to maintain any power, water or other utilities during demolition, such lines shall be temporarily relocated, as necessary.

Hazardous Substances – It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

Falling Debris/Objects – No material shall be dropped to any point lying outside the exterior walls of the structure unless the area is effective protected. Access to the area where falling objects/debris may be encountered must be gated and controlled.

Structural Collapse – Structural or load supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. Walls, which are to serve as retaining walls against which debris will be piled, shall not be so used unless capable of safely supporting the imposed load. Mechanical equipment shall not be used on floors or working surfaces unless such floors or surfaces are not of sufficient strength to support the imposed load.

Rollover Guards – All equipment used in site clearing operations shall be equipped with rollover guards meeting the applicable requirements. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the applicable requirements.

Inspections – During demolition, continuing inspections by a licensed Professional Engineer shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, walls, or loosened material. No FP shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

9.2.3 Excavation and Cut/Fill Operations

9.2.3.1 Excavation/Trenching

Description of Tasks

This task includes the excavation of contaminated soils and superficial debris. Excavation depths vary across the site.

Hazard Identification

The hazards of this activity are associated with heavy equipment operation, subsurface intrusion, manual materials handling, stockpiling, and disposal. Subsurface intrusion presents hazards associated with negotiating buried utilities, cave-ins of the excavated areas, and regress methods for personnel working inside the excavated areas. Disruption of contaminated soil also presents a health hazard.

Controls

Underground Utilities – The estimated locations of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during the excavation work, shall be determined prior to opening an excavation. Utility companies or owners shall be contacted ("Call Before You Dig") within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation.

When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by save and acceptable means. While the excavation is open, underground installations shall be protected, supported, or removed, as necessary, to safeguard site personnel.

Cave-Ins – Project personnel in an excavation shall be protected from cave-ins by an adequate protective system, except when:

- Excavations are made entirely in stable rock or excavations are less than five feet in depth and examination of the ground by the SSO provides no indication of a potential cave-in.
- Protective systems shall have the capacity to resist, without failure, all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

Project personnel shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by the SSO for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the SSO prior to the start of work and as needed throughout operations. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when project personnel exposure can be reasonably anticipated.

Where the SSO finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed personnel shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Excavation Egress – A stairway, ladder, ramp, or other safe means of egress shall be located in trench excavations that are four feet or more in depth so as to require no more than 25 feet or lateral travel for project personnel.

9.2.3.2 Heavy Equipment Operation

Description of Tasks

Heavy equipment to be used for this task include, but are not limited to, excavators, dozers, dump trucks, and water sprayers (if required).

Hazard Identification

The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and an object gets caught between two moving parts of the equipment. Operation of the heavy construction equipment may produce harmful noise.

Controls

Equipment Inspection – All vehicles in use shall be checked prior to operation to ensure that all parts, equipment, and accessories that affect safe operations are in proper operating condition and free from defects. All defects shall be corrected before the vehicle is placed in service.

Ground Guides – No personnel shall use any motor vehicle, earthmoving, or compacting equipment having an obstructed view to the rear, unless:

- The vehicle has a reverse signal alarm distinguishable from the surrounding noise level; or
- The vehicle is backed up only when an observer signals that it is safe to do so.

Blocking – Heavy machinery, equipment, or parts thereof that are suspended or held aloft shall be substantially blocked to prevent falling or shifting before employees are permitted to work under or between them.

Noise – Control measures for noise are addressed in Section 4.9.

Traffic – Control measures for traffic are addressed in Section 8.17.

9.2.3.3 Disturbance/Handling of Contaminated Material

Description of Tasks

After the contaminated soil is excavated from below the Site's surface, the material will be stockpiled, dried, and either transported offsite or relocated and backfilled on site.

Hazard Identification

The hazards associated with materials handling include contact of the contaminated material with project personnel, or cross contamination with other site soil.

Controls

Cross Contamination – Following excavation, contaminated soil stockpiles will be placed on a structure constructed to separate the material from the site soil and collect any groundwater leachate. The material shall be covered to prevent storm water erosion or migration of contaminants through storm water.

Air Monitoring – Air and particulate monitoring will be conducted during soil excavation activities to assess the potential for exposure to airborne COCs. If the results of air monitoring indicate the presence of organic vapors or particulates in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. A description

of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

Traffic – Control measures for traffic are addressed in Section 8.17.

9.2.4 Drilling/Subsurface Intrusion Activities

Description of Tasks

Site mobilization will include establishing excavation locations, determining the location of utilities and other installations, and establishing work areas. Mobilization will also include setting up equipment and establishing a temporary site office. A break area will be set up outside of regulated work areas. Mobilization may involve clearing areas for the SZ and CRZ. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify safety and health issues that may have arisen since the writing of this plan.

Hazard Identification

The primary physical hazards for this activity are associated with the use of soil boring and grouting equipment. The equipment is hydraulically powered and uses static force and dynamic percussion force to advance sampling and penetrating tubes.

Accidents can occur as a result of improperly placing the equipment on uneven or unstable terrain or failing to adequately secure the equipment prior to the start of operations. Overhead utility lines can create hazardous conditions if contacted by the equipment. Underground installations such as electrical lines, conduit, and product lines pose a significant hazard if contacted.

Controls

Geoprobe and Drill Rig Safety Procedures - The operator of the equipment must possess required state or local licenses to perform such work. All members of the crew shall receive site-specific training prior to beginning work.

The operator is responsible for the safe operation of the rig, as well as the crew's adherence to the requirements of this HASP. The operator must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the operator, wear all personal protective equipment, and be aware of all hazards and control procedures. The operator and crew must participate in the Daily Safety Meetings and be aware of all emergency procedures.

Equipment Inspection - Each day, prior to the start of work, the rig and associated equipment must be inspected by the operator. The following items must be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition of all hydraulic lines;
- Fire extinguisher; and
- First aid kit.

Equipment Set Up - The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels which remain on the ground must be chocked. The leveling jacks shall

not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

All well sites will be inspected by the driller prior to the location of the rig to verify a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

The drill rig must be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24" by 24" and 4" to 8" thick shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

Rules for Intrusive Activity - Before beginning any intrusive activity, the existence and location of underground pipe, conduit, electrical equipment, and other installations will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. "Call Before You Dig" will verify the potential for encountering subsurface utilities. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line.

Combustible gas readings of the general work area will be made regularly in areas where and/or during operations when the presence of flammable vapors or gases is suspected, such as during intrusive activities (see Section 5.1). Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the LEL in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

Overhead Electrical Clearances - If equipment is operated in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables, can come within the minimum clearances as follows:

Nominal System Voltage	**Minimum Required Clearance**
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

Hoisting Operations - Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Drill pipe, auger strings or casing should be picked up slowly. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor; no one else should be on the rig or derrick.

The brakes on the drawworks of the drill rig should be tested by the driller each day. The brakes should be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers should never stand near the borehole whenever any wire line device is being run.

Hoisting control stations should be kept clean and controls labeled as to their functions.

Catline Operations - Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or catline which is under tension.

Employees rigging loads on catlines shall:

- Keep out from under the load;
- Keep fingers and feet where they will not be crushed;
- Be sure to signal clearly when the load is being picked;
- Use standard visual signals only and not depend on shouting to coworkers; and
- Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

Wire Rope - When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or re-socketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less that five full tucks.

Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

Pipe/Auger Handling - Pipe and auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger or pipe sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.

Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

Slip handles should be used to lift and move slips. Employees are not permitted to kick slips into position.

When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.

Pipe and augers stored in racks, catwalks or on flatbed trucks should be secured to prevent rolling.

9.2.5 Subsurface Chemical Sample Collection/Analysis

Description of Tasks

This sub-task consists of the collection of soil samples for subsequent field and laboratory analysis. The physical hazards of soil sampling are primarily associated with the sample collection methods, procedures utilized, and the environment itself.

Hazard Identification

Incidental contact with COCs is the primary hazard associated with sampling the stabilized material. This contact may occur through the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. The primary hazards associated with these sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards directly associated with sampling procedures are generally limited to strains/sprains and potential eye hazards. Potential chemical hazards may include contact with media containing site COCs and potential contact with chemicals used for equipment decontamination.

Controls

PPE – To control dermal exposure during sampling activities, a minimum of Level D protection will be worn. If necessary, based on field observations and site conditions, air monitoring may be conducted during sediment sampling activities. If the results of air monitoring indicate the presence of airborne contaminants in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 5.1, Air Monitoring, for a description of air monitoring requirements and action levels. A description of each level of personal protection is included in Section 4.0, Personal Protective Equipment.

9.2.6 UST Closure

9.2.6.1 Working in Confined Spaces

Description of Tasks

The project may involve the closure of USTs, if identified.

Hazard Identification

Closure activities may require the entrance into confined spaces to facilitate cleaning and removal of the USTs.

Controls

All personnel required to enter into confined or enclosed spaces must be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of required protective and emergency equipment. The PO shall comply with all specific regulations that apply to work in dangerous or potentially dangerous areas.

9.2.6.2 Working with Compressed Air

Description of Tasks

The proposed method of purging the USTs includes the injection of compressed gas into the tank and attached piping network.

Hazard Identification

Uncontrolled release of the highly pressured air can cause injury to FP during this task. Cylinders must also be properly managed to ensure they are not compromised during storage and/or use.

Controls

Pressure Regulation – Compressed air used for cleaning purposes shall be reduced to less than 30 pounds per square inch and then only with effective chip guarding and personal protective equipment.

Cylinder Storage – Valve protection caps shall be in place and secured when compressed gas cylinders are transported, moved, or stored. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved. Compressed gas cylinders shall be secured in an upright position at all times, except if necessary for short periods of time when cylinders are actually being hoisted or carried. Cylinders shall be placed in a location where they cannot become part of an electrical circuit.

9.2.7 Decontamination

All equipment will be decontaminated before leaving the site. Personnel involved in decontamination activities may be inadvertently exposed to skin contact with contaminated materials and chemicals brought from the EZ. Personnel involved in decontamination activities must wear PPE that is, at a minimum, one level below the level worn by personnel working in the EZ.

9.2.8 Demobilization

Demobilization involves the removal of all tools, equipment, supplies, and vehicles brought to the site. The hazards of this phase of activity are associated with heavy equipment operation and manual materials handling.

Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. Heavy equipment operation presents noise and vibration hazards, and hot surfaces, to operators. Personnel in the vicinity of heavy equipment operation may be exposed to physical hazards resulting in fractures, contusions, and lacerations and may be exposed to high noise levels. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil. Freezing weather hazards include frozen, slick, and irregular walking surfaces.

Environmental hazards include plants, such as poison ivy and poison oak; aggressive fauna, such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather, such as sunburn, lightning, rain, and heat-or cold-related illnesses; and pathogens, such as rabies, Lyme disease, and blood-borne pathogens.

Control procedures for these hazards are discussed in Section 8.0, General Safety Practices.

9.3 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site COCs. Concentrations of airborne COCs during site tasks may be measurable and will require air monitoring during certain operations. Air monitoring requirements for site tasks are outlined in Section 5.1.

COCs at the site include heavy metals, some VOC compounds, some SVOC compounds and potentially other industrial chemicals including PCBs and pesticides.

The potential for inhalation of site COCs is low. The potential for dermal contact with soils containing site COCs during remedial operations is moderate. Table 6 lists the primary contaminants that have been identified at the Site and the media in which they are present.

Table 6 – List of Primary Contaminants

Media: Soil

SVOCs	Maximum Concentration (mg/kg)	Applicable Monitoring Instrument
Indeno(1,2,3-cd)pyrene	0.573	PID
Metals	**Maximum Concentration (mg/kg)**	**Applicable Monitoring Instrument**
Barium	404	Not Applicable
Cadmium	3.2	Not Applicable
Copper	133	Not Applicable
Lead	209	Not Applicable
Mercury	0.33	Not Applicable
Nickel	301	Not Applicable
Zinc	2,270	Not Applicable

Media: Groundwater

SVOCs	Maximum Concentration (ug/L)	Applicable Monitoring Instrument
Perfluorooctanoic acid	46.7	Not Applicable
Perfluoroctanesulfonic acid	52.8	Not Applicable
SVOCs	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Benzo(a)pyrene	1.2	PID
Metals	**Maximum Concentration (ug/L)**	**Applicable Monitoring Instrument**
Chromium	211	Not Applicable
Iron	98,200	Not Applicable
Lead	216	Not Applicable
Manganese	3,890	Not Applicable
Sodium	45,300	Not Applicable

Media: Soil Vapor

VOCs	Maximum Concentration (ug/m^3)	Applicable Monitoring Instrument
Trichloroethene (TCE)	390	PID
Tetrachloroethene (PCE)	1,200	PID
Methylene Chloride	200	PID

10.0 EMERGENCY PROCEDURES

10.1 General

Prior to the start of operations, the work area will be evaluated for the potential for fire, contaminant release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the FS/SSO immediately.

The FS/SSO will establish evacuation routes and assembly areas for the site. All personnel entering the site will be informed of this route and the assembly area.

10.2 Emergency Response

If an incident occurs, the following steps will be taken:

- The FS/SSO will evaluate the incident and assess the need for assistance and/or evacuation;
- The FS/SSO will call for outside assistance as needed;
- The FS/SSO will ensure the PM is notified promptly of the incident; and
- The FS/SSO will take appropriate measures to stabilize the incident scene.

10.2.1 Fire

In the case of a fire at the site, the FS/SSO will assess the situation and direct fire-fighting activities. The FS/SSO will ensure that the PM is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish with one fire extinguisher, the local fire department will be summoned.

10.2.2 Contaminant Release

In the event of a contaminant release, the following steps will be taken:

- Notify FS/SSO immediately;
- Evacuate immediate area of release;
- Conduct air monitoring to determine needed level of PPE; and
- Don required level of PPE and prepare to implement control procedures.

The FS/SSO has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-site areas.

10.3 Medical Emergency

All employee injuries must be promptly reported to the SSO/FS, who will:

- Ensure that the injured employee receives prompt first aid and medical attention;
- In emergency situations, the worker is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room); and
- If the injured person is a SESI employee, notify SESI at 973-808-9050.

10.3.1 Emergency Care Steps

Survey the scene. Determine if it is safe to proceed. Try to determine if the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.

- Do a primary survey of the victim. Check for airway obstruction, breathing, and pulse. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- Phone Emergency Medical Services (EMS). Give the location, telephone number used, caller's name, what happened, number of victims, victim's condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- Perform CPR as necessary.
- Do a secondary survey of the victim. Check vital signs and do a head-to-toe exam.

Treat other conditions as necessary. If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

10.4 First Aid - General

All persons must report any injury or illness to their immediate supervisor or the FS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The FS and SSO must fill out an accident/incident report as soon as emergency conditions no longer exist and first aid and/or medical treatment has been ensured. The report must be completed and submitted to the PM within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured person(s) should be transported to the medical facility. If the injured person is not ambulatory or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

10.4.1 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures, will be removed from the work area and transported to the designated medical facility for examination and treatment.

10.4.2 First Aid - Ingestion

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information. If the victim is unconscious, keep them on their side and clear the airway if vomiting occurs.

10.4.3 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

10.4.4 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ, must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective

clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

10.5 Reporting Injuries, Illnesses, and Safety Incidents

Injuries and illnesses, however minor, will be reported to the FS immediately. The FS will complete an injury report and submit it to the HSM, and the PM by end of shift.

10.6 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in **Table 7** below.

Table 7 – Emergency Contacts

Local Emergency Contacts	**Telephone No.**
EMERGENCY	911
Westchester Square Medical Center	(718) 430-7300
Police Emergency	911
Fire Emergency	911
Rescue Squad	911
Ambulance	911
Miscellaneous Contacts	**Telephone No.**
N.Y. Poison Control Center	(800) 222-1222
National Response Center and Terrorist Hotline	(800) 424-8802
Center for Disease Control	(800) 311-3435
Utility Mark-Out	(800) 962-7962

10.6.1 Directions to Hospital

Westchester Square Medical Center
2475 St Raymond Ave, The Bronx, NY 10461

Directions to Hospital:

17 min (4.2 miles)

via I-278 E

Fastest route, despite the usual traffic

1001 Whitlock Ave
Bronx, NY 10459

Take Bruckner Blvd, I-278 E and Zerega Ave to Rowland St

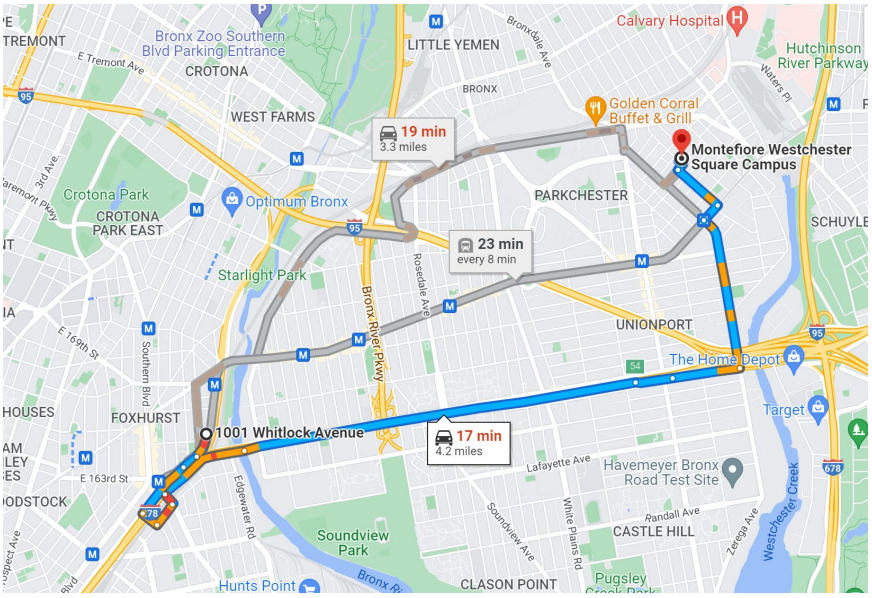
14 min (4.0 mi)

Continue on Rowland St. Drive to Seddon St

2 min (0.3 mi)

Westchester Square Medical Center
2475 St Raymond Ave, Bronx, NY 10461

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



11.0 LOGS, REPORTS, AND RECORD KEEPING

The following is a summary of required health and safety logs, reports, and record keeping for the operations at the subject site.

11.1 HASP Field Change Request

To be completed for initiating a change to the HASP. PM approval is required. The original will be kept in the project file (See Attachment 3).

11.2 Medical and Training Records

The HSM must obtain and keep a log of personnel meeting appropriate training and medical qualifications for the site work. The log will be kept in the project file. Each company's Human Resources Department will maintain medical records, in accordance with 29 CFR 1910.1020.

11.3 Exposure Records

Any personnel monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.1020. For SESI employees, the originals will be sent to the Human Resources Manager. For subcontractor employees, the original file will be sent to the subcontractor employer with a copy maintained in the SESI project file.

11.4 Accident/Incident Report

Any accident/incident reports must be completed following procedures given in Section 10.5 of this HASP. The originals will be sent to the HSM for maintenance. A copy of the forms will be kept in the project file. (See Attachment 4)

11.5 OSHA Form 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the project site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Human Resources Manager for maintenance. Subcontractor employees must also meet the requirements of maintaining an OSHA 200 Form. The accident/incident report meets the requirements of the OSHA Form 101 (Supplemental Record), which must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

11.6 On-Site Health and Safety Field Logbooks

The HSM or designee will maintain an on-site health and safety log book in which daily Site conditions, activities, personnel, and significant events will be recorded. Calibration records and personnel monitoring results, if available, will also be recorded in the field logbook. The original logbook will be kept in the project file.

Whenever any personnel monitoring is conducted onsite, the monitoring results will be noted in the filed logbook. These will become part of the exposure records file and will be maintained by the HSM.

A signatory page is included (See Attachment 5) and is to be signed by those working on and/or visiting the site.

11.7 Material Safety Data Sheets

Material Safety Data Sheets (MSDS) will be obtained and kept on file at the project site for each hazardous chemical brought to, use, or stored at the Site (See Attachment 6).

12.0 COVID-19 RESPONSE ACTION PLAN

SESI is concerned with the safety and well-being of its employees, vendors, subcontractors, and others with access to its offices and job sites, with particular emphasis on the unique challenges posed by COVID-19.

SESI has established the following protocols in keeping with the recommendations of the CDC and other sources including State Governor Executive Orders for work taking place on construction sites.

We request that all SESI employees, vendors, and subcontractors help with our prevention efforts while at work.

In order to minimize the spread of COVID-19, we must all cooperate in doing the following:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol. Always wash hands that are visibly soiled.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.
- Discourage handshaking, avoid touching your eyes, nose, or mouth with unwashed hands.
- Limit the sharing of tools, machinery, equipment, phones, desks, and computers.
- Wear cloth face coverings on all construction sites.
- Avoid close contact with people who are sick.
- Employees who have symptoms (i.e., fever, cough, or shortness of breath) should notify their supervisor and stay home—DO NOT GO TO WORK.
- Sick employees should follow CDC-recommended steps. Employees should not return to work until the criteria to discontinue home isolation are met, in consultation with healthcare providers and state and local health departments.

The following are the specific jobsite protocols and response actions to be taken in the event someone on site has been in contact with, or has themselves, the COVID-19 virus:

OFFICE/JOBSITE PROTOCOL

- If an employee/worker exhibits COVID-19 symptoms, the employee/worker must remain at home until he or she is symptom free for 72 hours (3 full days) without the use of fever-reducing or other symptom-altering medicines (e.g. acetaminophen, cough suppressants). SESI will similarly require an employee or worker that reports to work with symptoms to return home until they are symptom free for 72 hours (3 full days).
- Limit person to person contact, and when unavoidable, maintain CDC distancing guidelines.
- Avoid eating lunch in groups.
- Avoid in-person meetings if possible. If an in-person meeting is necessary, conduct it in a well-ventilated area with enough space for attendees to distance themselves from one another. Field jobsite meetings should be conducted in smaller group meetings (no more than 5 persons when possible) versus one large meeting.
- Only workers necessary to the execution of the work should be at the jobsites. No non-essential visitors should be permitted at the worksite.

RESPONSE ACTION TRIGGER EVENTS:

- an employee/worker at work has tested positive for COVID-19
- an employee/worker at work has suspected, but unconfirmed, case of COVID-19
- an employee/worker self-reported that they came in contact with someone who had a presumptive positive case of COVID-19
- an employee/worker has been exposed to the virus but only found out after they have interacted with others

RESPONSE ACTIONS:

- Upon occurrence of any of the Trigger Events above, employees/subcontractors shall notify SESI Management about the suspected employee/worker infected with, or exposed to, COVID-19.
- SESI Management will investigate the incident to confirm the report is valid.
- Employees/Subcontractors shall investigate their respective infected employee(s) and report the following to SESI Management and HR:
    - Identify all individuals who worked in proximity (six feet) of the infected employee/worker,
    - Employee(s)/Worker(s) infected with the COVID-19 virus, and employee(s)/worker(s) that came in contact with the infected employee/worker shall be sent home for a period of 14 days,
    - Do not identify the infected employee/worker by name to avoid violation of privacy/confidentiality laws, and,
    - Keep SESI Management informed of progress and updates.

- If an infected person was in the office, SESI will clean and disinfect common areas and surfaces, in accordance with CDC recommendations.
- SESI Management will notify affected employees/workers of the Trigger Event and instruct them to take the response actions above.

- **SESI Management policy requires written documentation from a health care professional, that confirmed infected employees can return to work.**

Except for circumstances in which SESI is legally required to report workplace occurrences of communicable disease, the confidentiality of all medical conditions will be maintained in accordance with applicable law and to the extent practical under the circumstances. When required, the number of persons who will be informed of an employee's/worker's condition will be kept at the minimum needed to appropriately notify other potentially affected employees/workers of Trigger Events and to attempt to minimize the potential for transmission of the virus.

ATTACHMENT 1

AIR MONITOR LOG

Air Monitoring: Sample Collection and Analysis

Date & Time of Monitoring	Task / Operation Being	Substance(s)/ Hazard(s) Being	Monitoring Location	Type/Method of Monitoring	Monitoring Results	Exposure Limits	Required Action

ATTACHMENT 2

OSHA POSTER

Job Safety and Health

It's the law!

OSHA®

Occupational Safety and Health Administration
U.S. Department of Labor

EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
The Best Resource for Safety and Health

Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

1-800-321-OSHA (6742)
www.osha.gov

OSHA 3165-02 2012R

ATTACHMENT 3

FILED CHANGE REQUEST FORM

HEALTH & SAFETY PLAN
CHANGE NOTICE

Pages _____ of _____

Project: H&S-CN

1) HASP VERSION: _____ SECTION: _____ PAGE (s): _____

RE: --- Change to existing HASP Anticipated Revision Date: _____
--- Addition to existing HASP
--- Other: _____
_____CONT._____

2) PROPOSED CHANGE: _____
_____
_____
_____

3) REASON FOR PROPOSED CHANGE(s):
--- Required by SPEC or Change Order --- Other: _____
--- Disposition of Deficiency _____CONT._____
--- Change in Regulatory or Other Requirements
--- Operational Experience

4) EXHIBITS ATTACHED ____ NO ____ YES (If YES, describe) _____
_____CONT._____

5) PMK APPROVALS PROJECT MANAGER: _____ Date: _____
SITE MANAGER: _____ Date: _____
H&S MANAGER: _____ Date: _____

Client Approval Required: ____ NO ____ YES (If YES, date submitted) _____

6) CLIENT APPROVAL _____ APPROVED _____ REMANDED _____ REJECTED

Comments: _____
_____
_____ CONT._____

Client Representative: _____Date: _____

7) DISTRIBUTION AFTER APPROVAL

X HASP UPDATE LIST --- OTHER: _____
X CLIENT _____
X PROJECT FILES _____

8) PREPARED BY: _____Date: _____
Title: _____

ATTACHMENT 4

INJURY REPORT FORM

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (____)_____–_____ Date ___/___/___

Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ___/___/___

4) Date hired ___/___/___

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional _____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the *Log* _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ___/___/___

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM ☐ Check if time cannot be determined

14) ***What was the employee doing just before the incident occurred?*** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) ***What happened?*** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) ***What was the injury or illness?*** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) ***What object or substance directly harmed the employee?*** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*

18) ***If the employee died, when did death occur?*** Date of death ___/___/___

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor

Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ______________________

City ______________ State ______________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
___	___	___	___/___ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
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___	___	___	___/___ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
___	___	___	___/___ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
___	___	___	___/___ month/day	___	___	☐	☐	☐	☐	___ days	___ days	☐	☐	☐	☐	☐	☐
					Page totals ➤	___	___	___	___	___	___	___	___	___	___	___	___
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	_____	(4) Poisonings	_____
		(5) Hearing loss	_____
(2) Skin disorders	_____	(6) All other illnesses	_____
(3) Respiratory conditions	_____		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

__ __ __ __

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

__ __ __ __ __ __

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) - / /
Phone Date

ATTACHMENT 5

SIGNATORY PAGE

Attachment 4 – Site-Specific Health and Safety Orientation Signatory Page
HEALTH AND SAFETY PLAN

Title	Name	Signature
[illegible]	[illegible]	
[illegible]	[illegible]	

[illegible]

Signature	Printed Name	Company	Date

Attachment 4 – Health and Safety Orientation Signatory Page (continued)

Signature	Printed Name	Company	Date

Attachment 6

Material Safety Data Sheets

SAFETY DATA SHEET

Version 5.8
Revision Date 02/02/2018
Print Date 10/19/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[*a*]pyrene

Product Number : 48564
Brand : Supelco
Index-No. : 601-032-00-3

CAS-No. : 50-32-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H317 May cause an allergic skin reaction.
H340 May cause genetic defects.
H350 May cause cancer.
H360 May damage fertility or the unborn child.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and

	understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	3,4-Benzpyrene 3,4-Benzopyrene Benzo[def]chrysene benzo[pqr]tetraphene
Formula	:	$C_{20}H_{12}$
Molecular weight	:	252.31 g/mol
CAS-No.	:	50-32-8
EC-No.	:	200-028-5
Index-No.	:	601-032-00-3

Hazardous components

Component	Classification	Concentration
Benzo[a]pyrene		
	Skin Sens. 1; Muta. 1B; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H317, H340, H350, H360, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low		

		as possible. Suspected human carcinogen		
		Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
Benzo[a]pyrene	50-32-8	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.100000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		1910.1002 As used in §1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood, and other organic matter. Asphalt (CAS 8052-42-4, and CAS 64742-93-4) is not covered under the 'coal tar pitch volatiles' standard OSHA specifically regulated carcinogen		
		TWA	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products. cyclohexane-extractable fraction See Appendix C See Appendix A		
		TWA	0.2 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological	Basis

				specimen	
	-	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance — Form: solid

b) Odour — No data available

c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 177 - 180 °C (351 - 356 °F)
f)	Initial boiling point and boiling range	495 °C (923 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.35 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5.97
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

LD50 Subcutaneous - Rat - 50 mg/kg

Skin corrosion/irritation
Skin - Mouse
Result: Mild skin irritation

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
Chronic exposure may cause dermatitis.

Germ cell mutagenicity
May alter genetic material.
In vivo tests showed mutagenic effects

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (Benzo[a]pyrene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Benzo[a]pyrene)
OSHA:	OSHA specifically regulated carcinogen (Benzo[a]pyrene)

Reproductive toxicity
May cause congenital malformation in the fetus.
Presumed human reproductive toxicant

May cause reproductive disorders.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 0.02 mg/l - 72 h

12.2 Persistence and degradability

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 48 h - 0.0005 mg/l
	Bioconcentration factor (BCF): 3,208

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Benzo[a]pyrene)
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[a]pyrene)
Marine pollutant:yes

IATA

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[a]pyrene)

Further information

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date

Benzo[a]pyrene	50-32-8	2007-03-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Benzo[a]pyrene	50-32-8	1990-01-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Muta.	Germ cell mutagenicity

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.8 Revision Date: 02/02/2018 Print Date: 10/19/2018

SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benzo[<I>b</>]fluoranthene
Product Number	:	48490
Brand	:	Supelco
Index-No.	:	601-034-00-4
CAS-No.	:	205-99-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone number

Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	3,4-Benzofluoranthene
Formula	:	C<SB>20</>H<SB>12</>
Molecular weight	:	252.31 g/mol
CAS-No.	:	205-99-2
EC-No.	:	205-911-9
Index-No.	:	601-034-00-4

Hazardous components

Component	Classification	Concentration
Benz[e]acephenanthrylene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benz[e]acephenanthrylene	205-99-2	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 163 - 165 °C (325 - 329 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
TDLo Oral - Mouse - 7.57 mg/kg
Remarks: Liver:Changes in liver weight. Endocrine:Changes in thymus weight.
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[e]acephenanthrylene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (Benz[e]acephenanthrylene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h(Benz[e]acephenanthrylene)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Benz[e]acephenanthrylene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[e]acephenanthrylene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[e]acephenanthrylene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

California Prop. 65 Components

, which is/are known to the State of California to cause cancer.	CAS-No.	Revision Date
For more information go to www.P65Warnings.ca.gov.	205-99-2	2007-09-28
Benz[e]acephenanthrylene		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350 May cause cancer.

H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 07/16/2018
Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Benzo[<I>k</>]fluoranthene

Product Number : 48492
Brand : Supelco
Index-No. : 601-036-00-5

CAS-No. : 207-08-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C<SB>20</>H<SB>12</>
Molecular weight	:	252.31 g/mol
CAS-No.	:	207-08-9
EC-No.	:	205-916-6
Index-No.	:	601-036-00-5

Hazardous components

Component	Classification	Concentration
Benzo[k]fluoranthene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters
Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzo[k]fluoranthene	207-08-9	1-Hydroxypyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment
Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Colour: yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 215 - 217 °C (419 - 423 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available

m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Carcinogenicity- Rat- Implant

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benzo[k]fluoranthene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benzo[k]fluoranthene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: DF6350000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Benzo[k]fluoranthene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

Reportable Quantity (RQ) : 5000 lbs

no
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[k]fluoranthene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1994-04-01

California Prop. 65 Components

, which is/are known to the State of California to cause cancer.	CAS-No.	Revision Date
For more information go to www.P65Warnings.ca.gov.	207-08-9	2007-09-28
Benzo[k]fluoranthene		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350	May cause cancer.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/16/2018 Print Date: 01/21/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 07/17/2018
Print Date 01/21/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benz[*a*]anthracene
Product Number	:	48563
Brand	:	Supelco
Index-No.	:	601-033-00-9
CAS-No.	:	56-55-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone number

Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Carcinogenicity (Category 1B), H350

Acute aquatic toxicity (Category 1), H400

Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H350 May cause cancer.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P273	Avoid release to the environment.
P281	Use personal protective equipment as required.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	1,2-Benzanthracene Tetraphene
Formula	:	C<SB>18</>H<SB>12</>
Molecular weight	:	228.29 g/mol
CAS-No.	:	56-55-3
EC-No.	:	200-280-6
Index-No.	:	601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store at room temperature.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available

n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
LD50 Intravenous - Rat - > 200 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.
Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Benz[a]anthracene)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
Not dangerous goods
IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[a]anthracene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]anthracene)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H350	May cause cancer.
H400	Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 07/17/2018 Print Date: 01/21/2019

SDS preview

LEAD

DANGER

7439-92-1

by Fisher Scientific

Synonyms

C.I. 77575, C.I. Pigment Metal 4, EINECS 231-100-4, Glover, HSDB 231, Lead flake, Olow, Plumbum, CI 77575, Plumbum metallicum, Blei, CI pigment metal 4, EC 231-100-4, KS-4, Lead, Lead element, Lead S2, Olow [Polish], Omaha & grant, Pb-S 100, Rough lead bullion, CCRIS 1581, Lead metal, Lead S 2, SSO 1, UNII-2P299V784P

Hazard statements

Harmful if inhaled
Harmful if swallowed
May cause cancer
May cause damage to organs through prolonged or repeated exposure
May cause drowsiness or dizziness

Precautions

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Rinse mouth
Store locked up

Hazard category

Acute toxicity, inhalation, Acute toxicity, oral, Carcinogenicity, Specific target organ toxicity, repeated exposure, Specific target organ toxicity, single exposure; Narcotic effects

:200View GHS Label8&param1=ZmRwLjFfNzE0NjEwMDNORQ==&unique=1525284976)

The information contained herein is based on data compiled from the chemical components of the (M)SDS and may not accurately represent the safety hazards for the product. Only the manufacturer of the product can make actual representations about the hazard profile of a chemical product. No warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

SAFETY DATA SHEET

Version 3.15
Revision Date 03/05/2018
Print Date 11/10/2018

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : Sigma-Aldrich
Index-No. : 080-001-00-0

CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
Acute aquatic toxicity (Category 1), H400
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H330 Fatal if inhaled.
H360 May damage fertility or the unborn child.
H372 Causes damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Hazardous components

Component	Classification	Concentration
Mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H410	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store under inert gas.
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		

		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: silver, white

b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C (673.9 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	< 0.01 hPa (< 0.01 mmHg) at 20 °C (68 °F) 1 hPa (1 mmHg) at 126 °C (259 °F)
l)	Vapour density	6.93 - (Air = 1.0)
m)	Relative density	13.55 g/cm3 at 25 °C (77 °F)
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapour density	6.93 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Mercury/mercury oxides.
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: OV4550000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l

Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: A. W. Mercury
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

IATA
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
Mercury	7439-97-6	2015-11-23

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Mercury	CAS-No. 7439-97-6	Revision Date 2013-12-20

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Repr.	Reproductive toxicity

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.15 Revision Date: 03/05/2018 Print Date: 11/10/2018

SAFETY DATA SHEET

Creation Date 24-Nov-2010 **Revision Date** 19-Jan-2018 **Revision Number** 3

1. Identification

Product Name **Manganese, powder, -325 mesh**

Cat No. : **AC317440000; AC317440010; AC317442500**

CAS-No 7439-96-5
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Serious Eye Damage/Eye Irritation	Category 2

Label Elements

Signal Word
Warning

Hazard Statements
Flammable solid
Causes serious eye irritation

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Wear protective gloves/protective clothing/eye protection/face protection
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Manganese	7439-96-5	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention.

Inhalation Remove from exposure, lie down. Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms and effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits

Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material.

Hazardous Combustion Products
None known.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required.
Environmental Precautions	See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

Handling	Avoid contact with skin and eyes. Do not breathe dust. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools.
Storage	Keep in a dry, cool and well-ventilated place. Refer product specification and/or product label for specific storage temperature requirement. Keep container tightly closed. Keep away from heat, sparks and flame. Keep under nitrogen.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Manganese	TWA: 0.02 mg/m³ TWA: 0.1 mg/m³	(Vacated) TWA: 1 mg/m³ Ceiling: 5 mg/m³ (Vacated) STEL: 3 mg/m³ (Vacated) Ceiling: 5 mg/m³	IDLH: 500 mg/m³ TWA: 1 mg/m³ STEL: 3 mg/m³	TWA: 0.2 mg/m³ TWA: 1 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures	Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark brown
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	1260 °C / 2300 °F
Boiling Point/Range	1900 °C / 3452 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Mn
Molecular Weight	54.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Moisture sensitive.

Conditions to Avoid Incompatible products. Exposure to moisture.

Incompatible Materials Acids, Bases, Halogens

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Manganese	LD50 = 9 g/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Manganese	7439-96-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Manganese	Not listed	LC50: > 3.6 mg/L, 96h semi-static (Oncorhynchus mykiss)	Not listed	Not listed

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT
UN-No UN3089
Proper Shipping Name Metal powder, flammable, n.o.s.
Technical Name Manganese
Hazard Class 4.1
Packing Group III

TDG
UN-No UN3089
Proper Shipping Name Metal powder, flammable, n.o.s.
Hazard Class 4.1
Packing Group III

IATA

UN-No	UN3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing Group	III

IMDG/IMO

UN-No	UN3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
Manganese	7439-96-5	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
Manganese	7439-96-5	X	-	231-105-1	X	X	X	X	KE-22999

U.S. Federal Regulations

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Manganese	7439-96-5	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Manganese	X		-

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Manganese	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

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Creation Date	24-Nov-2010
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Print Date	19-Jan-2018
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

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Appendix H:

Remedial System Optimization Table of Contents

REMEDIAL SYSTEM OPTIMIZATION FOR SONERO METRO AUTO SITE:

TABLE OF CONTENTS