

175 Roger Avenue
NASSAU COUNTY
INWOOD, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C130164

USEPA ID # NYD002059202

Prepared for:

Inwood 175, LLC & AJM Capital II, LLC
Great Neck, New York 11023

Prepared by:

Fleming, Lee Shue Environmental Engineering and Geology D.P.C.

158 West 29th Street
New York, New York 10001
(212) 675-3225

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

MARCH 2023

MARCH 2023

CERTIFICATION STATEMENT

I **ARNOLD F. FLEMING** 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.

3/22/2023

_____ DATE

TABLE OF CONTENTS

175 ROGER AVENUE
NASSAU COUNTY
INWOOD, NEW YORK

SITE MANAGEMENT PLAN

<u>Section</u>	<u>Description</u>	<u>Page</u>
Table of Contents		
ES	EXECUTIVE SUMMARY	1
	Introduction	4
1.1	General	4
1.2	Revisions	5
1.3	Notifications	5
2.0	SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS	3
2.1	Site Location and Description	3
2.2	Physical Setting	3
2.2.1	Land Use	3
2.2.2	Geology	3
2.2.3	Hydrogeology	4
2.3	Investigation and Remedial History	5
2.4	Remedial Action Objectives	9
	Groundwater	10
	Soil	10
	Soil Vapor	10
2.5	Remaining Contamination	11
2.5.1	Soil	11
2.5.2	Groundwater	14
2.5.3	Soil Vapor	14
3.0	INSTITUTIONAL AND ENGINEERING CONTROL PLAN	17
3.1	General	17
3.2	Institutional Controls	17
3.3	Engineering Controls	19

3.3.1	Composite Cover and Vapor Barrier/Waterproofing.....	19
3.3.2	Sub-slab Depressurization (SSD) System	20
3.3.3	Criteria for Completion of Remediation/Termination of Remedial Systems.....	20
4.0	<i>Monitoring and sampling plan</i>	23
4.1	General	23
4.2	Site-wide Inspection	24
4.3	Treatment System Monitoring and Sampling.....	25
4.3.1	Remedial System Monitoring.....	25
4.4	Post-Remediation Media Monitoring and Sampling.....	26
4.4.1	Groundwater Sampling.....	27
4.4.2	Monitoring and Sampling Protocol	30
4.4.3	Soil Vapor Intrusion Sampling	30
5.0	<i>OPERATION AND MAINTENANCE PLAN.....</i>	32
5.1	General	32
5.1.1	Fire Safety	32
6.0	<i>PERIODIC ASSESSMENTS/EVALUATIONS.....</i>	33
6.1	Climate Change Vulnerability Assessment	33
6.2	Green Remediation Evaluation	34
6.2.1	Timing of Green Remediation Evaluations.....	34
6.2.2	Remedial Systems	35
6.2.3	Building Operations	35
6.2.4	Frequency of System Checks, Sampling and Other Periodic Activities	35
6.2.5	Metrics and Reporting.....	36
7.0.	<i>REPORTING REQUIREMENTS.....</i>	37
7.1	Site Management Reports	37
7.2	Periodic Review Report	39
7.2.1	Certification of Institutional and Engineering Controls.....	41
7.3	Corrective Measures Work Plan.....	43
8.0	<i>REFERENCES</i>	44

TABLE OF CONTENTS (Continued)

LIST OF TABLES

Table 1	Notifications (in text)
Table 2A & 2B	Endpoint Analytical Results and Remaining Soil Sample Results Above Soil Cleanup Objectives (in text)
Table 3	Pre-Remediation Groundwater Analytical Results
Table 4	Soil Vapor Summary Results, 2020 (in text)
Table 5	Remedial System Monitoring Requirements and Schedule (in text)
Table 6	Post-Remediation Sampling Requirements and Schedule (in text)
Table 7	Monitoring Well Construction Details (in text)
Table 8	Interim Maintenance Summary/Schedule (in text)

LIST OF FIGURES

Figure 1	Site Location
Figure 2	Site Layout
Figure 3A	Geologic Cross Section A-A'
Figure 3B	Geologic Cross Section B-B'
Figure 4	Groundwater Contour Map
Figure 5	Post-Remedy Endpoint Results above Unrestricted Use SCOs (Draft)
Figure 6A	Pre-Remediation Groundwater Sampling Results above TOGS
Figure 6B	Temp. Groundwater Sampling Intervals and Results above TOGS
Figure 7	Pre-Remediation Soil Vapor Results
Figures 8A & 8B	Sub-slab Depressurization System Layout
Figure 9	Monitoring Well Network

LIST OF APPENDICES

Appendix A	Environmental Easement, Letter to Municipality and Survey
Appendix B	Site Contacts
Appendix C	Soil Boring Logs (Remedial Investigation)
Appendix D	Excavation Work Plan
Appendix E	Community Air Monitoring Program
Appendix F	Health and Safety Plan

Appendix G	Approved SSD Design Document &Sub-slab Depressurization Operation and Maintenance Plan
Appendix H	Quality Assurance Project Plan
Appendix I	Site Management Forms
Appendix J	Field Sampling Plan
Appendix K	Responsibilities of Owner and Remedial Party
Appendix L	Request to Import/Reuse Fill or Soil Form

List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
FEMA	Federal Emergency Management Agency
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NAVD	North American Vertical Datum
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study

ROD	Record of Decision
RP	Remedial Party
RRSCOs	Restricted Residential Soil Cleanup Objectives
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
URSCOs	Unrestricted Use Soil Cleanup Objectives
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound

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:

Site Identification:	C130164; 175 Roger Avenue, Inwood, NY	
Institutional Controls:	1. The property may be used for restricted residential use	
	2. Environmental Easement	
	3. All Engineering Controls must be inspected at a frequency and in a manner as defined in this SMP.	
	4. The site may be used for: restricted residential, commercial, and industrial use;	
	5. All ECs must be operated and maintained as specified in this SMP;	
	6. All ECs must be inspected at a frequency and in a manner defined in this SMP;	
	7. The use of groundwater underlying the site is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from NYSDEC;	
	8. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;	
	9. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;	
	10. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;	
	11. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;	

	<p>12. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;</p> <p>13. 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;</p> <p>14. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 2, and any potential impacts that are identified must be monitored or mitigated;</p> <p>15. Vegetable gardens and farming on the site are prohibited;</p> <p>16. 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.</p>
Engineering Controls	1. Vapor Barrier
	2. Passive Sub-slab Depressurization System
	3. SSD for soil vapor if needed for SVI mitigation
	4. Composite Cover System
Inspections:	Frequency
1. Composite Cover System	Annual
2. Sub-slab Depressurization System	Annual
Monitoring:	
1. Groundwater Monitoring Wells	Semiannual
2. Monitoring for Soil Vapor Intrusion	As Needed
Maintenance:	
1. Sub-slab Depressurization System	As Needed if Activated
Reporting:	
1. Groundwater Monitoring Report	Semiannual

2. Periodic Review Report	Annual
3. Soil Vapor Intrusion Report (if necessary)	TBD

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 (SMP) is a required element of the remedial program for the 175 Roger Avenue Site located in Inwood, New York (hereinafter referred to as the “Site”). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C130164, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

Inwood 175, LLC & AJM Capital II, LLC entered into a Brownfield Cleanup Agreement (BCA) on August 12, 2019 with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in Figure 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”. Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Nassau 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 (Index #C130164-07-19; Site # C130164) 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 Fleming, Lee Shue Environmental Engineering and Geology, D.P.C. (FLS), on behalf of Inwood 175, LLC & AJM Capital II, 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 pursuant to the Excavation Work Plan. 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 Brownfield Cleanup Agreement (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 on the following page 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: Notifications*

<u>Name</u>	<u>Contact Information</u>	<u>Required Notification**</u>
NYSDEC Project Manager John Sheehan	(631) 444-0244 John.sheehan@dec.ny.gov	All Notifications
NYSDEC Project Manager's Supervisor Chris Engelhardt	(631) 444-0235 chris.engelhardt@dec.ny.gov	All Notifications
NYSDEC Site Control Kelly A. Lewandowski	(518) 402-9569 Kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
NYSDOH Project Manager Dan Tucholski	(518) 486-7016 Daniel.Tucholski@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 in Inwood, Nassau County, New York and is identified as Section 40 Block L and Lots 5, 55, 56, 57, 59, 117, 2579, and 2585 on the Nassau County Land & Tax Map (see Figure 2). The site is a 3.5537-acre area and is bounded by Roger Avenue to the north and Sony Pictures Entertainment, Metro Marine Express, and a parking lot further to the north; residential properties to the south and Bayview Avenue beyond; Gates Avenue and commercial properties to the east; and a warehouse owned by Expeditors to the west (see Figure 2 – Site Layout 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:

Inwood 175, LLC

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a vacant lot. The Site is zoned Y Industrial and Light Manufacturing and is currently vacant. There are no Site occupants.

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

2.2.2 Geology

The site is on a westward facing peninsula that extends into Jamaica Bay, a marine waterbody. According to the *Hydrogeologic Study Fountain Avenue*,

Pennsylvania Avenue, and Edgemere Landfills, Part 1- Regional Report prepared by Gibbs and Hill in 1984, the Site geology is as follows:

The study area [Jamaica Bay and surrounding areas] is included in the Atlantic Coastal Plain Physiographic Province, and is built of pre-Cambrian(?) age crystalline bedrock buried under several hundred feet of late Cretaceous and Pleistocene sediments.

. . . By Cretaceous times (65 to 135 million years ago) the entire area had been reduced to a peneplain (a flat to gently undulating land surface), over which sediments from eroding mountain ranges to the west were being deposited. Following marine invasions and lengthy periods of erosion during the Tertiary (65 to 1.5 million years ago), the Pleistocene was characterized by multiple southward advances of continental glaciers, which by erosion deposition processes shaped the morphology of the region as it is today. The glaciers melted away from the NYC metropolitan area approximately 12,000 to 15,000 years ago (Schuberth, 1968).

Soils

Soils generally become finer with depth. Soils generally consist of light brown to dark brown medium to fine sand from grade to five to 10 feet. Beginning at approximately 10 feet below grade the soils consist of sand mixed with discontinuous lenses of silt, clay, and gravels to approximately 18 feet below grade. Below approximately 18 feet sands and silty clay strata become more prominent. A discontinuous dark grey marine silt, clay and silty clay stratum underlies most of the site between 25 and 40 feet, although this layer is not believed continuous in some locations. [Geologic cross sections are shown in Figure 3A and 3B.](#) [Site-specific boring logs are provided in Appendix C.](#)

[2.2.3 Hydrogeology](#)

Regional groundwater flow in the water table aquifer is west towards Jamaica Bay (USGS Water Supply Paper 2498, *Water-table configuration*, plate 3, 1999). The onsite

groundwater is marked by a southwest-northeast divide, with groundwater flowing both northwest towards Jamaica Bay (north of the Site) and southeast toward a channel of Jamaica Bay south of the Site (Figure 4). Most of the groundwater flow across the site, based on elevation data collected from the onsite wells, is to the south. Hydraulic conductivity ranged from 4.2×10^{-5} centimeters per second (cm/sec) to 5.3×10^{-4} cm/sec and averaged 2.3×10^{-4} cm/sec based on eight rising head conductivity tests in eight wells. The groundwater table lies approximately five feet below the Site surface.

A tidal study was conducted during the SRI to investigate potential tidal influences on groundwater flow and contaminant migration. Ultimately, tidal fluctuations seemed to have little or no material effect on Site groundwater movement and water levels.

Nassau County Public Health Ordinance, 2014, prohibits the use of private wells where there is a public water supply. As such, groundwater in the area of the Site cannot be used, and any remaining contamination in groundwater will not pose a high risk of exposure.

A groundwater contour map is shown in Figure 4. Groundwater monitoring well construction logs will be provided in Appendix C after they are installed following building construction.

2.3 Investigation and Remedial History

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

The Site was developed with a 155,000 square foot, one-story warehouse building and a two-story warehouse and office building, which were constructed in several stages from 1954 to approximately 1967. The Site operated as a sheet metal fabrication factory since at least 1961. Rockaway Metal Products occupied the Site from approximately 1971 to 1987. In June 1992, the United States Environmental Protection Agency (USEPA), based on reports of improperly stored hazardous waste, conducted a Site inspection and discovered approximately two-hundred forty (240) 55-gallon deteriorated and/or leaking drums, a 5,000-gallon tanker trailer, underground storage tanks (USTs), and observed dry

wells containing sludge materials. The USEPA conducted an Emergency Removal Action beginning in August 1993 to address the hazardous condition. The drums, tanker trailer, one (1) 1,000-gallon heating oil UST, and UST piping were removed. The Site was subsequently used as a warehouse and by other tenants, including an auto repair shop (Gunter Auto Shop) and Long Island Party Rentals, from 1990 to 2004. The Site was acquired by Nassau County in 1995 and has remained vacant since approximately 2004. The warehouse building was damaged in a fire in February 2011, which ultimately contributed to the rationale for Nassau County to demolish the buildings in 2019. Site ownership varied over the years as follows:

Date	Owner
1954 – circa 1967	Sheet Metal Fabrication
1971 – 1987	Rockaway Metal Products
1993 – 1995	175 Roger Corp.
1995 – May 2022	Nassau County
May 2022 – Present	Inwood 175, LLC

The Site, according to an environmental database review, contained several USTs. Three abandoned-in-place USTs were removed during remedial excavation and exploration in 2022. These included one 5,000-gallon petroleum and two 1,000-gallon solvent USTs that had been filled with sand and/or sand-cement slurry and abandoned-in-place.

ATC Associates, Inc. (ATC) investigated the Site subsurface in 2005. ATC advanced a number of soil borings and monitoring wells throughout the Site and identified Volatile Organic Compounds (VOCs), chlorinated VOCs, and petroleum compounds as the principal contaminants in groundwater, both of which were interpreted to be associated with USTs. ATC also identified drywells that contained predominantly petroleum-based VOCs and metals as the contaminants in soil and sludge in these units.

ATC conducted another investigation in 2009 that added to the soil borings and monitoring wells in the 2005 investigation. The investigation found VOCs in soils near the

USTs in the northern portion of the Site, petroleum hydrocarbons in groundwater beneath the UST area, and dissolved chlorinated VOCs (CVOCs) throughout much of the Site. The investigation found metals in drywells. Tetrachloroethene (PCE) and Trichloroethene (TCE) were the primary compounds in sub-slab vapor.

Thirty-eight soil samples collected during both ATC investigations contained PCE at concentrations that ranged from non-detect to 190 micrograms/kilogram ($\mu\text{g}/\text{kg}$). TCE in 34 ATC samples ranged from non-detect to 19 $\mu\text{g}/\text{kg}$, xylenes in 40 ATC samples ranged from non-detect to 740,000 $\mu\text{g}/\text{kg}$, and 124-Trimethylbenzene in 59 samples ranged from non-detect to 870,000 $\mu\text{g}/\text{kg}$. The chlorinated VOC PCE was also detected in 164 groundwater samples ranged from non-detect to approximately 15,000 micrograms/liter ($\mu\text{g}/\text{L}$), TCE in 156 samples ranged from non-detect to 6,100 $\mu\text{g}/\text{L}$, xylenes in 147 samples ranged from non-detect to approximately 107,000 $\mu\text{g}/\text{L}$, and 124-Trimethylbenzene in 160 samples ranged from non-detect to approximately 94,000 $\mu\text{g}/\text{L}$. The highest concentrations were detected in the UST area. Chlorinated VOCs were also detected in 18 soil vapor samples with concentrations of PCE ranging from non-detect to approximately 4,300 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and TCE that ranged from non-detect to approximately 54 $\mu\text{g}/\text{m}^3$.

In 2020, FLS conducted a *Supplemental Remedial Investigation (SRI)*. The purpose was to collect current data (the Site was last sampled approximately 12 years prior by ATC) to augment the ATC results and collect information necessary to aid in the remedial design. FLS advanced soil borings to the clay/silt stratum at approximately 30 to 35 feet below grade. The SRI corroborated the ATC investigation's findings and identified two areas that required remediation: a UST Area in the northern portion of the site and nine drywells on the western side of the property.

FLS found that Site conditions improved substantially since the 2009 ATC investigation. The concentrations of dissolved chlorinated VOCs decreased appreciably across the Site (Figure 6A and 6B). The data confirmed that the principal contaminated areas were the soil and groundwater in the UST area in the north and in the drywells on the western part of the Site. Chlorinated and non-chlorinated VOCs were predominant in the UST area soils and metals were the principal contaminants in the drywell soil/sludge (arsenic, cadmium, lead, mercury). Chlorinated VOCs (CVOCs) were detected in

groundwater beneath the Site, albeit at much lower concentrations than in 2009. Chlorinated VOCs in groundwater in the UST Area occurred at depth, near the silt/clay stratum, but exhibited a three-fold reduction compared to levels in 2009 (e.g. PCE ranged from non-detect to 15,000 µg/L in circa 2009 and from non-detect to 7,610 µg/L in 2020). Soil vapor levels decreased significantly, too, and most individual chlorinated soil vapor results were at relatively low concentrations, mostly non-detect to single digits. Impacts above NYSDOH guidelines (Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 with revision in May 2017) occurred in only 4 out of 17 soil vapor and sub-slab soil vapor samples (Figure 7). Concentrations of PCE in soil vapor samples collected during the 2020 SRI ranged from non-detect to 548 µg/m³, but most values measured 20 µg/m³ or less. Concentrations of TCE in soil vapor samples from the same investigation ranged from non-detect to 55 µg/m³, but most values measured 12 µg/m³ or less. Details of soil, groundwater, and soil vapor sampling may be found in the *Supplemental Remedial Investigation Report*, 175 Roger Avenue Commercial Development, Fleming Engineering, November 2020.

In 2022, FLS conducted additional shallow soil sampling in the upper two feet of soil to augment the limited shallow soil data in the SRI dataset.¹ These samples were collected as the original plan of capping the site with two feet of soil was abandoned because the grading plan and Federal Emergency Management Agency (FEMA) guidelines required placing fill in some areas and excavating others, which made a two-foot-thick cap over the entire Site impractical. Details of soil, groundwater, and soil vapor may be found in the SRI and in the *Shallow Soil Sampling Results Report*, 175 Roger Avenue, Inwood, New York 11096. Fleming-Lee Shue, Inc., May 2022.

The shallow soil sampling found that all locations except one met the Site soil cleanup objectives, *i.e.*, the Restricted Residential Soil Cleanup Objectives (RRSCOs). In combination with the SRI, only two locations in the upper two feet of soil across the Site had a few results marginally above the RRSCOs, indicating that the upper two feet of soil could remain in place knowing it would be covered by a building and/or hardened surface.

¹ The original plan was to place a two-foot-thick soil cap over the entire site, so only a limited number of shallow soil samples were collected initially.

Additional details may be found in the *Shallow Soil Sampling Results Report*, 175 Roger Avenue, Inwood, New York 11096. Fleming-Lee Shue, Inc., May 2022.

Previous Investigations

The Site was investigated in several previous environmental investigations and remedial documents beginning in 2005 some of which are mentioned above. The studies investigated soils, groundwater, soil vapor, Site history, and adjacent land use. Previous investigations and relevant documents include the following:

1. Phase I Environmental Site Assessment of Long Island Party Rentals, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., June 19, 2005.
2. Site Investigation Report Long Island Party Rentals, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., June 27, 2005.
3. NYSDEC Brownfield Cleanup Program Remedial Investigation Work Plan, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., April 20, 2007.
4. NYSDEC Brownfield Cleanup Program Remedial Investigation Report, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., July 8, 2009.
5. NYSDEC Brownfield Cleanup Program Alternative Analysis Report Remedial Work Plan, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., April 20, 2010.
6. Phase I Environmental Site Assessment, 175 Roger Avenue, Inwood, New York 11096. Fleming-Lee Shue, Inc., November 2018.
7. Supplemental Remedial Investigation Report, 175 Roger Avenue Commercial Development, Fleming Engineering, November 2020.
8. Phase I Environmental Site Assessments, November 2018 and March 2022, FLS.
9. Shallow Soil Sampling Results Report, 175 Roger Avenue, Inwood, New York 11096. Fleming-Lee Shue, Inc., May 2022.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated October 13, 2021 are as follows:

Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater contamination.

Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

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

Little contamination remains following remediation. Remediation achieved clean endpoint samples that in all cases met the site cleanup goals. *All endpoint samples met the site-specific Soil Cleanup Objectives, the 6NYCRR Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs).* No remaining soil exceeds the site cleanup goals. Any remaining contamination is expected to be slightly over the Unrestricted Use SCOs (URSCOs). Subsurface infrastructure did not interfere with any aspect of remediation.

2.5.1 Soil

Endpoint samples were collected for TAL metals in the drywells and TCL VOCs plus STARS list VOCs and TAL metals in the UST Area excavation. *All endpoint samples met the site-specific Soil Cleanup Objectives, the 6NYCRR Part 375 Restricted Residential Soil Cleanup Objectives (RRSCOs).* Therefore, no remaining soil exceeds the site cleanup goals. Tables 2A, 2B and Figure 5 present the results of all soil samples collected that exceed the Unrestricted Use SCOs (URSCOs) at the site after completion of remedial action. Many of the endpoint sample results did in fact meet the URSCOs and many were only slightly over these criteria .

Two areas of soil remediation took place by means of excavation. These include 10 drywells on the western portion of the site and the UST Area in the northern portion. In addition, two shallow soil areas were excavated so as to ensure that all soils in the upper two feet met the RRSCOs. Figure 5 shows the remediated areas, endpoint samples, locations where endpoint samples did not meet the URSCOs, and final grade elevations. Figure 5 also depicts the location of the demarcation barrier.

Following soil excavation to depth, backfilling began with ¾-inch crushed stone to the approximate level of the water table. Recycled Concrete Aggregate (RCA) obtained from crushing the concrete slab on site then filled the excavation to within two feet of the surface. Atop the RCA or crushed stone at two feet below the surface was placed the demarcation barrier consisting of plastic orange fencing. Finally, two feet of approved imported and/or approved Site soil, completed the excavation to grade over the

demarcation barrier. The stone, RCA, and imported fill were compacted using a 10-ton roller under the supervision of the geotechnical engineer during backfilling.

The demarcation barrier lies two feet below grade in all drywells and in the UST Area excavation. The demarcation barrier lies two feet below grade at each location where non-remedial excavation occurred, such as in the former septic fields and where building foundation footings were removed. This was done to make clear that a two-foot cap of approved fill covers the entire site. Otherwise, all soil in the upper two feet is soil meeting the RRSCOs. All known subsurface structures were removed during remediation.

Drywell Remediation

The principal contaminants before remediation were arsenic, lead, copper, mercury, cadmium, and chromium in soils/sludge at the bottom of the drywells. These were remedied by excavating a total of 10 dry wells (originally nine drywells were identified) on the western side of the property to 9 ft. to 10 ft. below grade (Figure 5). The concrete drywells, surrounding soils, and gravel were excavated to these depths along with a few sections of concrete pipe in individual excavations that were approximately 10 to 15 ft. in diameter. Endpoint samples were collected at the bottom of the excavations. All endpoint samples were below the RRSCOs and only one metal, selenium (14.1 mg/kg), was above the URSCO in sample DW-1 (9-9.5) (Table 2A). Approximately 300 cubic yards of soil were removed as part of the drywell remediation.

**Table 2A—Drywell Endpoint Samples Above Unrestricted Use
Soil Cleanup Objectives, mg/kg**
All Drywell Endpoint Results are Below the Site Soil Cleanup Criteria (RRSCOs)

Sample	Analyte	Result	Unrestricted Use Soil Cleanup Objective	Restricted Residential Soil Cleanup Objective (RRSCO)*
DW-1(9-9.5)	Selenium	14.1	3.9	180

* Site Soil cleanup objectives

UST Area Excavation

The principal contaminants before remediation were tetrachloroethylene (PCE), trichloroethylene (TCE), xylenes, and trimethylbenzene attributed to leaking USTs.

Remediation began with removal of three USTs (one 5,000-gallon fuel oil UST and two 1,000-gallon solvent USTs). All USTs had been previously abandoned in place and filled with cement/sand slurry. The 5,000-gallon UST also contained approximately 800 gallons of infiltrated groundwater.

The UST Area excavation measured approximately 59 feet by 90 feet (5,310 ft.²) and extended to a depth of 11 to 13 feet, with an average depth of 12.6 feet (Figure 5). As such, six bottom samples and 12 sidewall endpoint samples were collected to document post remedy conditions. In all, approximately 2,000 cubic yards of soil were removed from the UST Area excavation. A total of 13,025 pounds of Zero Valent Iron (ZVI) was mixed into the upper two feet of the bottom of the excavation after soil removal to promote cleanup of groundwater. All bottom and sidewall endpoint soil sample results were below the RRSCOs. Several VOCs were above the URSCOs as shown in Table 2B.

Table 2B—UST Area Endpoint Samples Above Unrestricted Use Soil Cleanup Objectives, mg/kg
 All UST Area Endpoint Results are Below the Site Soil Cleanup Criteria (RRSCOs)

Sample	Analyte	Position	Result	Unrestricted Use Soil Cleanup Objective	Restricted Residential Soil Cleanup Objective (RRSCOs)*
UST SW-1 (9.5-10)	Ethylbenzene	Sidewall	2.9	1	41
UST SW-1 (9.5-10)	Xylenes	Sidewall	2.84	0.26	100
UST EP SW (12-12.5)	Ethylbenzene	Bottom	2.4	1	41
UST EP SW (12-12.5)	Xylenes	Bottom	12	0.26	100
UST EP SE (11.5-12)	Ethylbenzene	Bottom	6.1	1	41
UST EP SE (11.5-12)	Toluene	Bottom	7.6	0.7	100
UST EP SE (11.5-12)	1,2,4-Trimethylbenzene	Bottom	4.1	3.6	52
UST EP SE (11.5-12)	Xylenes	Bottom	31	0.26	100
UST EP NW (11-11.5)	Xylenes	Bottom	0.4	0.26	100
UST EP NE (12-12.5)	Xylenes	Bottom	6.2	0.26	100
UST SW-10 (7-7.5)	Xylenes	Sidewall	1.9	0.26	100
UST EP-W (13-13.5)	Ethylbenzene	Bottom	2.8	1	41
UST EP-W (13-13.5)	Methylene chloride	Bottom	0.82	0.05	100
UST EP-W (13-13.5)	Xylenes	Bottom	13	0.26	100
UST EP-E (13-13.5)	Ethylbenzene	Bottom	2.6	1	41
UST EP-E (13-13.5)	Xylenes	Bottom	14	0.26	100
UST SW-7 (7-7.5)	Xylenes	Bottom	2.5	0.26	100

* Site Soil cleanup objectives.

Methylene chloride is a probable lab contaminant. It was not detected in any of the 2020 SRI 69 groundwater samples.

2.5.2 Groundwater

Table 3 and Figure 6A and 6B summarize the results of all samples of groundwater that exceed the SCGs as identified during the 2020 Supplemental Remedial Investigation.

2.5.3 Soil Vapor

Seventeen (17) soil vapor/sub-slab soil vapor samples were collected throughout the entire Site footprint in 2020 (there are no Site buildings). The breakdown of the soil vapor dataset for the chlorinated VOCs (some of which are dechlorinated daughter products for PCE and TCE) is summarized in Table 4. Soil vapor results for PCE and TCE are presented in Figure 7.

Table 4 – Soil Vapor Results Summary, 2020, in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

Soil Vapor VOCs	No. Obs.	Min	p25	p50	p75	Max	NYSDOH Ambient Air Guidance Value
Methylene Chloride	17	1.7	2.1	3.1	4.9	21	60
Tetrachloroethene (PCE)	17	nd	0.14	1.5	14	548	30
Trichloroethene (TCE)	17	nd	0.04	0.45	3.4	55.4	2
Carbon Tetrachloride	17	nd	nd	nd	nd	nd	
Chloroform	17	nd	nd	nd	nd	nd	
Chloromethane	17	nd	nd	nd	nd	0.91	
1,2-Dichloroethane	17	nd	nd	nd	nd	3.6	
1,1-Dichloroethene	17	nd	nd	nd	nd	nd	
1,1-Dichloroethane	17	nd	nd	nd	nd	nd	
cis-1,2-Dichloroethene	17	nd	nd	nd	nd	nd	
Vinyl Chloride	17	nd	nd	nd	nd	nd	
Acetone	17	7.1	42.3	54.6	73.9	375	
2-Butanone (MEK)	17	nd	1.4	2	2.6	10	

PCE and TCE data summaries computed using Regression on Order Statistics (ROS) to account for non-detects.
 Min. – minimum value, p25 – 25th percentile, p50 – 50th percentile, p75 – 75th percentile, Max – maximum value. nd – non-detect.

The results for most of the VOCs in Table 4 are below detection limits or are relatively low concentrations. Of the detected compounds with published NYSDOH Ambient Air Guidance Values, the maximum methylene chloride soil vapor concentration is well below the NYSDOH Ambient Air Guidance Value of $60 \mu\text{g}/\text{m}^3$. For TCE, five of the 17 soil vapor samples contained the compound at concentrations above the NYSDOH Ambient Air Guidance Value of $2 \mu\text{g}/\text{m}^3$. Samples SSV-8 ($6.4 \mu\text{g}/\text{m}^3$), SSV-12 ($3.4 \mu\text{g}/\text{m}^3$), SSV-9 ($12 \mu\text{g}/\text{m}^3$), SSV-13 ($53.7 \mu\text{g}/\text{m}^3$), and SSV-10 ($55.4 \mu\text{g}/\text{m}^3$) are on the eastern side of the Site, with the two highest values located near the eastern Site border and coinciding with the highest PCE soil vapor concentrations.

All but three of the 17 soil vapor samples had concentrations below the NYSDOH Ambient Air Guidance Value for PCE of $30 \mu\text{g}/\text{m}^3$. The samples above this guideline were SSV-9 ($43 \mu\text{g}/\text{m}^3$), SSV-13 ($111 \mu\text{g}/\text{m}^3$), and SSV-10 ($548 \mu\text{g}/\text{m}^3$). These are on the eastern side of the Site and the two highest values are near the Site’s eastern boundary.

The balance of the Site had PCE and TCE soil vapor concentrations below the NYSDOH Ambient Air Guidance Values (Figure 7).

Table 4 and Figure 7 summarize the results of all samples of soil vapor that exceed the SCGs before completion of the remedial action. Post-remedial soil vapor sampling was not required or necessary.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC 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, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix D) 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) limit the use and development of the site to Restricted Residential and lower uses only. Adherence to these ICs on the site is required by the Environmental

Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 2. These ICs are:

- The property may be used for: restricted residential, commercial, and industrial use;
- 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 the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater 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 2, 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 Composite Cover and Vapor Barrier/Waterproofing

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a minimum of 24 inches of soil meeting the Restricted Residential Soil Cleanup Objectives, asphalt pavement, concrete-covered sidewalks, and concrete building slabs. Figure 2 presents the location of the cover system and applicable demarcation layers, which consist of plastic orange fencing . The Excavation Work Plan (EWP), provided in Appendix D, outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in the Community Air Monitoring Plan (CAMP) and Health and Safety Plan (HASP) prepared for the Site. The CAMP and HASP are provided in Appendix E and Appendix F, respectively. Any disturbance of the site's cover system must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (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.

3.3.1.1 Cover (or Cap)

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

3.3.2 Sub-slab Depressurization (SSD) System

A passive Sub-slab Depressurization System (SSD) is a component of the remedy. The SSD will be installed during building construction according to the design approved by NYSDEC and NYSDOH. The passive system will be converted to an active system only if warranted by the results of the soil vapor intrusion sampling event that will be conducted following building construction. A work plan detailing the soil vapor intrusion sampling event will be submitted to the NYSDEC and NYSDOH for their review and comment. The passive SSD is another level of protection beyond the vapor barrier, seven-inch-thick new concrete slab, and nominal five feet of additional fill.

Procedures for operating and maintaining the passive SSD are documented in the [Operation and Maintenance Plan \(Section 5.0 of this SMP\)](#). A Site-specific Active SSD System Operation and Maintenance Plan will be added in Appendix G if the SSD transitions from passive to active. Please see Section 3.3.3.1 for a description of the triggering conditions for operation of the SSD as an active system. [As-built drawings, signed and sealed by a Professional Engineer \(PE\) who is licensed and registered in New York State](#), will be provided after the SSD is installed. [Figure 2](#) shows the location of the ECs for the site.

3.3.3 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).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC' *Groundwater Monitoring Well Decommissioning Procedures (CP-43)* policy.

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.

3.3.3.1 – Vapor Barrier and Sub-Slab Depressurization System

The SSD will be installed as a passive system during construction of the new building. A layout of the SSD system is provided in Figure 8. The passive SSD system will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If monitoring data indicates that the SSD system may no longer be required, a proposal to discontinue the SSD system will be submitted by the remedial party to the NYSDEC and NYSDOH project managers.

The SSD will be installed as a passive system with the capacity to be converted to an active system if warranted by the results of the soil vapor intrusion sampling event that will be conducted following building construction. A work plan detailing the soil vapor intrusion sampling event will be submitted to the NYSDEC and NYSDOH for their review and comment. Following construction and prior to occupancy, the SSD will be passive. Indoor air and sub-slab samples will be collected and analyzed for VOCs using EPA Method TO+15 to determine if the SSD needs to be converted to an active system. The determination will be made by evaluating the sampling data in conjunction with the New York State Department of Health Guidance for evaluating Soil Vapor Intrusion in the State of New York (including applicable updates) and the Department's DER-10 Technical Guidance for Site Investigation and Remediation document.

Further, if the SSD needs to be converted to an active system, the radius of influence will be determined using permanent sub-slab testing points installed throughout the slab during building construction (locations shown in Figure 8). The testing points will provide enough coverage of the slab to determine the number and type of fans needed to depressurize the entire area under the slab. Once the SSD system is activated, a soil vapor

intrusion sampling event will be conducted to confirm that the system is operating effectively.

The SSD will be inspected annually to ensure that tenant operations or improvements have not penetrated the slab/vapor barrier. The approved SSD design document is included in Appendix G.

3.3.3.2 - *Monitoring Wells associated with In Situ Chemical Reductant*

Groundwater monitoring activities to assess *in situ* chemical reductant technology will continue in accordance with Section 4, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards or the Site SCGs or have become asymptotic at an acceptable level over an extended period. If monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the remedy will be submitted by the remedial party. Monitoring in accordance with Section 4 will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional injections, source removal, treatment and/or control measures will be evaluated.

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 H.

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 Site-wide Inspection

Site-wide inspections will be performed at a minimum frequency of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed 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 duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix I – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;

- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as defined in 6 NYCRR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Treatment System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Monitoring of the SSD will be performed on a routine basis, as identified in Table 5 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 SSD system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The SSD system components to be monitored include, but are not limited to, the components included in Table 5 below.

Table 5 – Remedial System Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
General Above grade System Piping	Condition	--	Annual
Roof vents	Condition	--	Annual
Vacuum Blower	If converted to an active system	-0.02 in. water column	Annual

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix I – 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.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the monitoring wells on a routine basis. Sampling locations required analytical parameters and schedule are provided in Table 6 – Remedial System Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

6 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters				Schedule
	VOCs (EPA Method 8260)	TAL Metals (EPA Method 6010B)	pH (Field Instrument)	VOC (USEPA Method TO-15)	
Monitoring Well Pairs #1 – 8	X	X	X		Semiannual
Indoor Air, Ambient Air ²				X	Once Following New Building Construction

Detailed sample collection and analytical procedures and protocols are provided in Appendix H – Quality Assurance Project Plan.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed semiannually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The network of on-site wells has been designed based on the following criteria:

The monitoring well network includes eight sentinel well clusters that monitor downgradient plume migration. Sentinel wells are uncontaminated wells located directly downgradient of the affected groundwater and upgradient of sensitive receptors. The monitoring well network for this site includes the following sentinel well clusters (Figure 9): MW-1 S/D, MW-2 S/D, MW-3 S/D, MW-4 S/D, MW-5 S/D, MW-6 S/D, MW-7 S/D, and MW-8 S/D. Each well cluster will consist of two co-located monitoring wells: a shallow well screened 10 to 20 feet below grade and a second deep well screened 20 to 30 feet below grade prior to remediation. The screened intervals were selected to monitor

² Refer to the Field Sampling Plan, Appendix J and NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (October 2006, with updates in May 2017).

VOC levels in the upper and lower zones above the low permeability stratum at depth. Refer to Figure 3 for geologic cross-sections.

The monitoring wells, locations, and depths were approved in consultation with NYSDEC on January 28, 2022. The monitoring wells were positioned to monitor remediation of the UST Area and to provide general coverage across the Site. They will be installed following construction of the new building at the locations indicated in Figure 9. If after one round of sampling, wells MW-4 S/D, MW-5 S/D, MW-6 S/D, MW-7 S/D, and MW-8 S/D show VOC and metals concentrations below or close to their respective evaluation criteria (*i.e.*, below water class GA standards in the *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), the responsible party may petition the Department to cease monitoring in these wells.

If VOC and metals concentrations in these wells are not consistently below their respective evaluation criteria or show an increase in contaminant levels, continued monitoring will ensue and/or additional remedial measures shall be employed, if required, based on consultation with the NYSDEC and NYSDOH. The type and scope of treatment will be determined in consultation with the Department based upon the contaminant levels and location of the wells.

Table 7 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, zero upgradient wells³, eight on-site wells and three downgradient wells (three of the eight total monitoring wells are downgradient wells) are sampled to evaluate the effectiveness of the remedial system. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

³ Site is on a groundwater divide; there is no upgradient of the site.

Table 7 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/latitude)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-1 S/D	Downgradient UST Area	TBD	2	TBD	TBD	TBD	TBD
MW-2 S/D	Downgradient UST Area	TBD	2	TBD	TBD	TBD	TBD
MW-3 S/D	Downgradient UST Area	TBD	2	TBD	TBD	TBD	TBD
MW-4 S/D	West Side Site	TBD	2	TBD	TBD	TBD	TBD
MW-5 S/D	West Side Site	TBD	2	TBD	TBD	TBD	TBD
MW-6 S/D	Southern Boundary	TBD	2	TBD	TBD	TBD	TBD
MW-7 S/D	Northeast Site Boundary	TBD	2	TBD	TBD	TBD	TBD
MW-8 S/D	Southeast Site Boundary	TBD	2	TBD	TBD	TBD	TBD

TBD – To be determined following installation of monitoring well after building construction.

Monitoring well construction logs will be provided following well installation after the new building is constructed and will be included in Appendix C of this SMP.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

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 groundwater monitoring program are specified in Section 7.0 – Reporting Requirements. Table 8 lists the groundwater monitoring and reporting requirements.

4.4.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix I - 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 J of this document.

4.4.3 Soil Vapor Intrusion Sampling

Soil vapor intrusion sampling will be performed if required at a frequency determined in consultation with the Department to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of on-site soil vapor intrusion sample locations has been designed based on the following criteria:

- Footprint area of the proposed warehouse
- Expected radius of influence of the SSD system

Soil vapor monitoring points will penetrate the 7-inch-thick slab and extend several inches into the gravel beneath the slab, the goal being to measure vapor beneath the floor slab. The vapor points will be sampled using 6-liter SUMMA canisters with 8-hour flow regulators for USEPA TO+15 analysis. The samples will be sent to an ELAP-certified laboratory (Appendix G contains the approved SSD sampling plan and sample locations).

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.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, (active) SSD systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP. If following a soil vapor intrusion investigation it is determined that the SSD should be operated as an active system, then an Operation Maintenance and Monitoring (OM&M) plan for the active SSD will be provided as an amendment to this SMP (Appendix G).

5.1.1 Fire Safety

This section will be completed following construction of the building and the SMP amended to include this information.

The remedial party will conduct a facility walk with the local fire chief and/or fire suppression team upon completion of site development or at the discretion of the local fire chief. The site walk will allow for the addition of the facility to any local preplanning efforts. The NYSDEC project manager will be provided with the local fire chief's/fire suppression team's recommendations as soon as they become available. Following review, the NYSDEC project manager may direct the remedial party to implement the recommendations and/or revise the SMP.

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. Bear in mind, the principal vulnerability is flooding, which will have already been addressed by raising the Site elevation several feet to comply with FEMA requirements.

A formal vulnerability assessment has not been prepared at the time of the SMP submission, but potential vulnerabilities, including storm water management, flooding, erosion, wind, and other hazards are discussed below.

The Site is served by the Nassau County sewer system. Significant adverse impacts related to water usage and supply are not expected as a result of the operation of the remedial systems, nor are significant adverse wastewater or storm water impacts anticipated as the remediation will be conducted within the confines of the Site boundary.

The Site is in a designated floodplain. The Site is on a peninsula with an overall elevation close to sea level. Site elevation ranges from approximately seven (7) ft. to nine (9) ft. with respect to the North American Vertical Datum of 1988 (NAVD88) and the average elevation is approximately eight and one-half (8.5) ft. NAVD88. Therefore, portions of the Site, particularly the new building floor slab, must be raised to a minimum of elevation eleven (11) feet NAVD88 to comply with FEMA flood protection

requirements. No surface water bodies exist on-Site and the closest surface water body is the Jamaica Bay, located approximately 600 ft. north of the Site and 1,000 ft. south of the Site. Due to raising the elevation to meet FEMA requirements, the risk of major flooding is low.

The properties surrounding the Site are primarily used for commercial and industrial purposes. Residential properties border the site on the south. Grading and site drainage will prevent runoff toward the residential properties. The Site is potentially susceptible to power loss and/or dips/surges in voltage during severe weather events, including lightning strikes, and the associated impact on Site equipment and operations. However, the surrounding area is highly developed and power outages will be rectified as soon as possible by the electricity provider. Due to the variability in annual weather patterns, it is assumed that emergency weather situations will be infrequent and damages rectified by the appropriate relief agency.

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).

The only remedial system possibly requiring power is operation of an active SSD (if converted from the passive system), which would be electrically and/or solar powered. Energy use for the SSD is minimal as it is used to power six radon vacuum fans (one fan/riser). The SSD does not generate any waste other than venting vapors to the outside. Well purging produces a small amount of liquid waste that is removed to a permitted waste disposal facility. No land is disturbed by the SSD. Please see Section 3.3.3.1 for a description of the triggering conditions for operation of the SSD as an active system.

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.

6.2.3 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

6.2.4 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.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix I – 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.

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 I. 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 8 and summarized in the Periodic Review Report.

Table 8: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Inspection Report	Annually with PRR
Groundwater Monitoring Report	Semiannually
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC
SVI Sampling Report (if needed)	To be determined

* 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 Periodic Review Report (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 that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
 - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
 - Operation and Maintenance (O&M) data summary tables;
 - A current plume map for sites with remaining groundwater contamination; and
 - A groundwater elevation contour map for each gauging event.
- 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™ formatted 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 Remedial Action Work Plan (RAWP), Record of Decision (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.

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 the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department 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 generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Arnold F. Fleming, of Fleming, Lee Shue Environmental Engineering and Geology, D.P.C., 158 W. 29th Street, New York, NY, am certifying as Owner's/Remedial Party's Designated Site Representative 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."

At the end of each certifying period, as determined by the NYSDEC project manager, the following certification will be provided to the NYSDEC project manager:

"For each institutional identified for the site, I certify that all of the following statements are true:

- *The institutional control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department 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 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, Arnold F. Fleming, of Fleming, Lee Shue Environmental Engineering and Geology, D.P.C., 158 W. 29th Street, New York, NY, am certifying as Owner's Designated Site Representative for the site."

- *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.

8.0 REFERENCES

1. 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
2. NYSDEC DER-10 – “Technical Guidance for Site Investigation and Remediation”.
3. NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).
4. Phase I Environmental Site Assessment of Long Island Party Rentals, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., June 19, 2005.
5. Site Investigation Report Long Island Party Rentals, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., June 27, 2005.
6. NYSDEC Brownfield Cleanup Program Remedial Investigation Work Plan, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., April 20, 2007.
7. NYSDEC Brownfield Cleanup Program Remedial Investigation Report, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., July 8, 2009.
8. NYSDEC Brownfield Cleanup Program Alternative Analysis Report Remedial Work Plan, 175 Roger Avenue, Inwood, New York 11096. ATC Associates Inc., April 20, 2010.
9. Phase I Environmental Site Assessment, 175 Roger Avenue, Inwood, New York 11096. Fleming-Lee Shue, Inc., November 2018.
10. Supplemental Remedial Investigation Report, 175 Roger Avenue Commercial Development, Fleming Engineering, November 2020.
11. Phase I Environmental Site Assessments, November 2018 and March 2022, FLS.
12. Shallow Soil Sampling Results Report, 175 Roger Avenue, Inwood, New York 11096. Fleming-Lee Shue, Inc., May 2022.
13. Gibbs & Hill, Inc., October 1984. *Hydrogeologic Study Fountain Avenue, Pennsylvania Avenue, and Edgemere Landfills*, Part 1- Regional Report.
14. Herbert T. Buxton and Peter K. Shernoff, “Ground-Water Resources of Kings and Queens Counties, Long Island, New York,” USGS Numbered Series, Ground-Water Resources of Kings and Queens Counties, Long Island, New York, vol. 2498, Water Supply Paper (U.S. Geological Survey, 1999), <https://doi.org/10.3133/wsp2498>.
15. Christopher J. Schuberth, *The Geology of New York City and Environs*, [1st ed.] (Garden City, N.Y.: Published for the American Museum of Natural History [by] Natural History Press, 1968).

Tables

Table not embedded in text, Table 3 only

Table 3 - Pre-Remediation Groundwater Analytical Results
 175 Reger Avenue - RCF Site No. C13014
 Lab Filtered Metals in Groundwater (ug/L)

Client Sample ID	NY DEC Class: GW Standards (NYDEC 609.4)	MW-1 JD1537-1 1/10/2020 Groundwater	MW-2 JD1455-1 1/6/2020 Groundwater	MW-3 JD1455-2 1/6/2020 Groundwater	MW-3 DUP JD1455-3 1/6/2020 Groundwater	MW-6 JD1537-2 1/10/2020 Groundwater	MW-8 JD1455-4 1/6/2020 Groundwater	MW-9 JD1455-5 1/6/2020 Groundwater	MW-13 JD1455-6 1/6/2020 Groundwater	MW-14 JD1537-3 1/10/2020 Groundwater	MW-15 JD1537-4 1/10/2020 Groundwater	MW-17 JD1537-5 1/10/2020 Groundwater	MW-18 JD1537-6 1/10/2020 Groundwater	MW-20 JD1537-7 1/10/2020 Groundwater	MW-22 JD1537-8 1/10/2020 Groundwater
Metals Analysis - values reported in ug/L															
Aluminum	-	<200	1370	<200	<200	<200	<200	4710	276	<200	867	208	<200	360	<200
Antimony	3	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	10.3	<6.0	<6.0	<6.0
Arsenic	25	3	5.7	17.6	17.5	3.9	<3.0	3.9	6.2	5.8	<3.0	<3.0	<3.0	3.3	<3.0
Barium	1000	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Beryllium	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	5	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Calcium	-	68400	35900	117000	117000	137000	39400	26500	78200	36400	50800	22800	58500	66900	73100
Chromium	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Copper	200	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	300	9450	5960	21500	21000	12900	182	5820	6890	2210	1910	210	153	437	128
Lead	25	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	8	<3.0	7.1	<3.0	<3.0	<3.0	<3.0	<3.0
Magnesium	-	8280	10600	14700	14800	9940	9180	11200	16700	11000	16200	<5000	8560	<5000	11600
Manganese	300	631	122	616	597	678	<15	183	696	324	22.8	<15	<15	17.4	95.6
Mercury	0.7	<0.20	<0.20	<0.20	0.23	<0.20	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nickel	100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Potassium	-	<100000	<100000	<100000	<100000	<100000	<100000	<100000	<100000	<100000	<100000	<100000	<100000	<100000	12900
Selenium	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Silver	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	20000	66800	12600	47600	47600	17100	56600	10100	29000	47900	13000	<10000	31900	21100	60800
Thallium	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vanadium	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Zinc	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	20.6	<20	<20	<20	<20

Notes:
 ND - Non-Detect
 J - Estimated Value
 a Associated CCV outside of control limits high, sample was ND.
 b Associated CCV outside of control limits low.
 c Associated CCV outside of control limits high, sample was ND. This compound in blank spike is outside in house QC limits bias high.
 d Elevated detection limit due to dilution required for high interfering element.
 e Elevated sample detection limit due to difficult sample matrix.

Table 3 - Pre-Remediation Groundwater Analytical Results
 175 Rieger Avenue - RCP Site No. C13044
 Lab Filtered Metals in Groundwater (ug/L)

Client Sample ID Lab Sample ID: Date Sampled: Matrix:	NY 10035 Class GA Standards (NYSDEC #2004)	TMP-1 (4-6) 5/20/2020 Groundwater	TMP-1 (10-15) 5/20/2020 Groundwater	TMP-1 (20-25) 5/20/2020 Groundwater	TMP-1 (30-35) 5/20/2020 Groundwater	TMP-2 (4-6) 5/21/2020 Groundwater	TMP-2 (10-15) 5/20/2020 Groundwater	TMP-2 (15-20) 5/21/2020 Groundwater	TMP-2 (30-35) 5/21/2020 Groundwater	TMP-2 (30-35) DUPL 5/21/2020 Groundwater	TMP-3 (4-6) 5/22/2020 Groundwater	TMP-3 (15-20) 5/22/2020 Groundwater	TMP-3 (20-25) 5/22/2020 Groundwater	TMP-3 (30-35) 5/22/2020 Groundwater	TMP-4 (4-6) 5/21/2020 Groundwater	TMP-4 (15-20) 5/21/2020 Groundwater	TMP-4 (20-25) 5/21/2020 Groundwater	TMP-4 (30-35) 5/21/2020 Groundwater
Aluminum	-	297	1710	17200	45200 ^b	10100	58800 ^b	28600 ^b	10700	22900 ^b	13100	21100	10700	20100	9250	16200 ^b	67600 ^b	1450
Antimony	3	<6.0	<6.0	<6.0	<30 ^b	<6.0	<30 ^b	<12 ^b	<6.0	<12 ^b	<6.0	<6.0	<6.0	<6.0	<6.0	<12 ^b	<12 ^b	<6.0
Arsenic	25	9.7	28.7	9.6	55.0 ^b	7.4	48.0 ^b	16.0 ^b	<6.0 ^d	15.8 ^b	14.7	12.1	7.3	20.6	8.4	9.6 ^b	<18 ^d	<3.0
Barium	1000	<200	<200	<200	<1000 ^b	<200	<1000 ^b	<400 ^b	<200	<400 ^b	<200	<200	<200	<200	<200	<400 ^b	<400 ^b	<200
Beryllium	-	<1.0	<1.0	<1.0	<5.0 ^b	<1.0	<5.0 ^b	<2.0 ^b	<1.0	<2.0 ^b	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0 ^b	<2.0 ^b	<1.0
Cadmium	5	<3.0	<3.0	<3.0	<15 ^b	<3.0	<15 ^b	<6.0 ^b	<3.0	<6.0 ^b	<3.0	<3.0	<3.0	<3.0	<3.0	<6.0 ^b	<6.0 ^b	<3.0
Calcium	-	47600	45500	46800	86500 ^b	62300	47200 ^b	52800 ^b	69100	67600 ^b	53100	37500	50000	18800	53800	33300 ^b	34700 ^b	50500
Chromium	50	<10	<10	58.6	765 ^b	20.8	144 ^b	118 ^b	90.5	219 ^b	33.3	27.3	29.4	173	15.5	103 ^b	112 ^b	20.2
Cobalt	-	<50	<50	<50	<250 ^b	<50	<250 ^b	<100 ^b	<50	<100 ^b	<50	<50	<50	<50	<50	<100 ^b	<100 ^b	<50
Copper	200	<10	<10	19.4	162 ^b	15	59.5 ^b	32.8 ^b	29.3	55.8 ^b	15	14	14	45.7	13.3	31.6 ^b	59.4 ^b	<10
Iron	300	5000	21000	27400	160000 ^b	11200	76000 ^b	60300 ^b	44500	81300 ^b	17100	30700	18300	55000	8020	36100 ^b	81000 ^b	14600
Lead	25	3.7	8.8	10.8	96.8 ^b	7	31.8 ^b	12.2 ^b	6.1 ^d	13.2	11.1	11	5.5	15.6	<3.0	8.4 ^b	34.4 ^b	<3.0
Magnesium	-	14700	7840	11100	<25000 ^b	9350	<25000 ^b	<10000 ^b	11400	14300 ^b	9450	9680	16300	11200	8680	<10000 ^b	18000 ^b	8050
Manganese	300	42.1	168	5590	2190 ^b	1030	1910 ^b	1090 ^b	474	779 ^b	123	1860	1680	506	90.9	833 ^b	1360 ^b	523
Mercury	0.7	<0.20	<0.20	<0.20	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nickel	100	<10	<10	19.5	200 ^b	11.7	58.0 ^b	41.8 ^b	37.9	62.4 ^b	12.9	18.4	20.1	48.7	<10	27.2 ^b	67.8 ^b	<10
Potassium	-	<10000	<10000	<10000	<50000 ^b	10200	<50000 ^b	<20000 ^b	<10000	<20000 ^b	13000	<10000	<10000	<10000	16100	<20000 ^b	<20000 ^b	<10000
Selenium	-	<10	<10	<10	<50 ^b	<10	<50 ^b	<20 ^b	<10	<20 ^b	<10	<10	<10	<10	<10	<20 ^b	<20 ^b	<10
Silver	50	<10	<10	<10	<50 ^b	<10	<50 ^b	<20 ^b	<10	<20 ^b	<10	<10	<10	<10	<10	<20 ^b	<20 ^b	<10
Sodium	20000	<10000	98100	87700	<50000 ^b	42800	175000 ^b	151000 ^b	29500	20300 ^b	73600	170000	142000	22100	30300	63200 ^b	138000 ^b	18800
Thallium	-	<10	<10	<10	<50 ^b	<10	<50 ^b	<20 ^b	<10	<20 ^b	<10	<10	<10	<10	<10	<20 ^b	<20 ^b	<10
Vanadium	-	<50	<50	50.2	<250 ^b	<50	<250 ^b	<100 ^b	<50	<100 ^b	<50	<50	<50	56.6	<100 ^b	113 ^b	113 ^b	<50
Zinc	-	<20	<20	50.4	416 ^b	26.6	165 ^b	99.6 ^b	115	145 ^b	28.4	49.5	44.2	92.4	<20	59.0 ^b	204 ^b	58.7

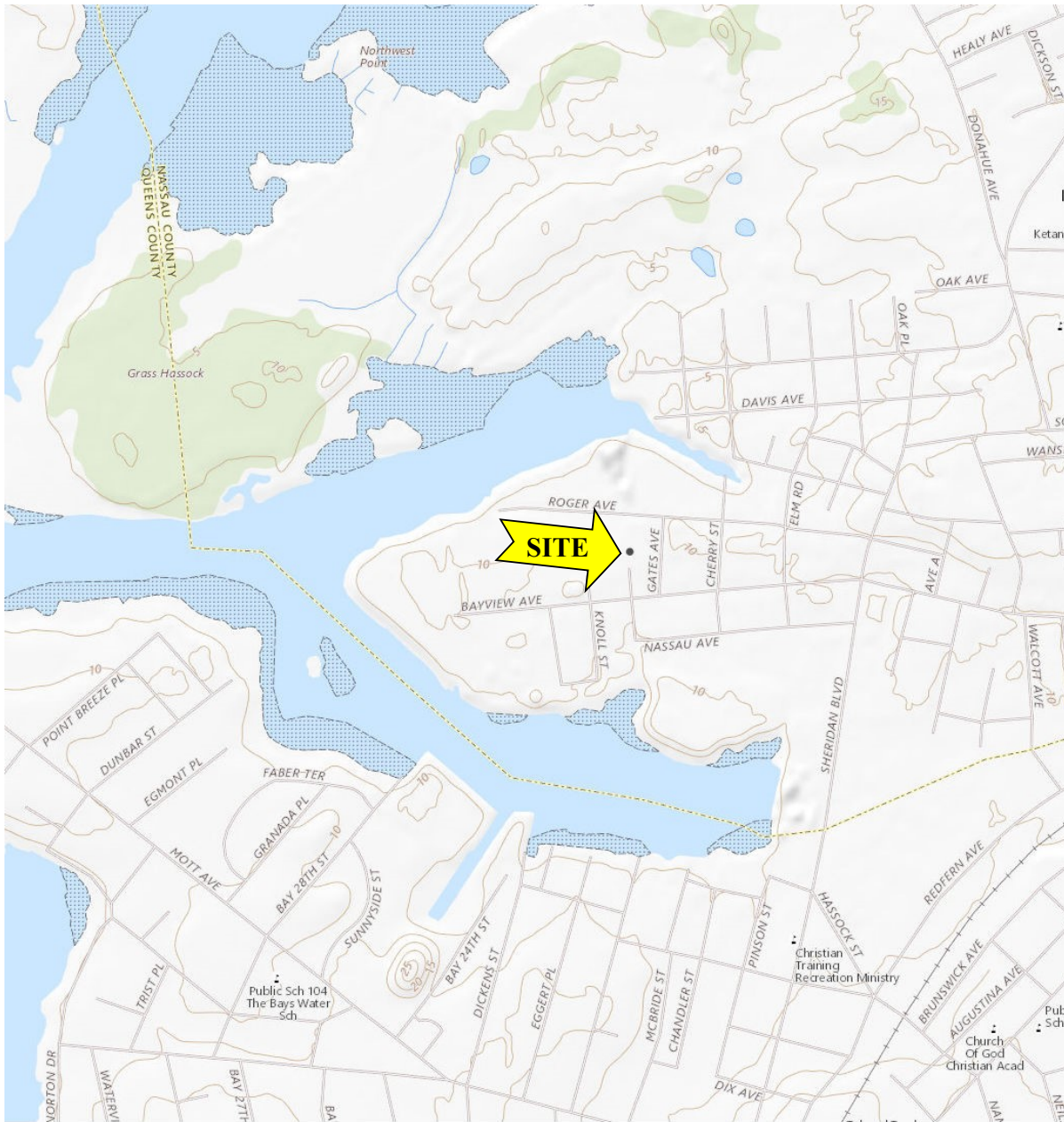
Notes:
 ND - Non-Detect
 J - Estimated Value
 a Associated CCV outside of CI
 b Associated CCV outside of CI
 c Associated CCV outside of CI
 d Elevated detection limit due to
 e Elevated sample detection limit

Table 3 - Pre-Remediation Groundwater Analytical Results
 175 Reger Avenue - RCP Site No. C130144
 Lab Filtered Metals in Groundwater (ug/L)

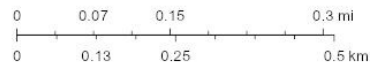
Client Sample ID	NY 10032 Class GA	TMP-5 (4-6)	TMP-5 (10-15)	TMP-5 (15-20)	TMP-5 (30-35)	TMP-6 (4-6)	TMP-6 (15-20)	TMP-6 (25-30)	TMP-6 (30-35)	TMP-7 (4-6)	TMP-7 (4-6) DUP	TMP-7 (10-15)	TMP-7 (15-20)	TMP-7 (30-35)	TMP-8 (5-10)	TMP-8 (10-15)	TMP-8 (20-25)	TMP-8 (30-35)
Lab Sample ID:	GW	J07643-11	J07643-12	J07643-13	J07643-14	J07627-19	J07627-20	J07627-21	J07627-23	J07627-5	J07627-6	J07627-7	J07627-8	J07627-9	J07495-17	J07495-16	J07495-18	J07495-19
Date Sampled:	(NYSDEC #)	5/29/2020	5/29/2020	5/29/2020	5/29/2020	5/27/2020	5/27/2020	5/27/2020	5/27/2020	5/26/2020	5/26/2020	5/26/2020	5/26/2020	5/26/2020	5/21/2020	5/21/2020	5/21/2020	5/21/2020
Matrix:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Metals Analysis - values report																		
Aluminum	-	865	14600	80200 ^b	71700 ^b	371000 ^b	42500 ^b	7710	39300 ^b	20400	2800	-	3450	15300	328000 ^b	2840	30500 ^b	29900 ^b
Antimony	3	<6.0	<6.0	<30 ^b	<30 ^b	<60 ^b	<30 ^b	<6.0	<30 ^b	<6.0	<6.0	-	<6.0	<6.0	<60 ^b	<6.0	<12 ^b	<12 ^b
Arsenic	25	12.2	65.7	58.5 ^b	43.5 ^b	370 ^b	26.5 ^b	8.4	62.5 ^b	31.3 ^a	5	-	3.2	14.2 ^d	387 ^a	3	10.4 ^b	45.0 ^b
Barium	1000	<200	<200	<1000 ^b	<1000 ^b	<2000 ^b	<1000 ^b	<200	<1000 ^b	<200	<200	-	<200	<200	<2000 ^b	<200	<400 ^b	<400 ^b
Beryllium	-	<1.0	<1.0	<5.0 ^b	<5.0 ^b	<15.0 ^b	<5.0 ^b	<1.0	<5.0 ^b	<1.0	<1.0	-	<1.0	<1.0	<10 ^b	<1.0	<2.0 ^b	3.4 ^b
Cadmium	5	<3.0	<3.0	<15 ^b	<15 ^b	<30 ^b	<15 ^b	<3.0	<15 ^b	<3.0	<3.0	-	<3.0	<3.0	<30 ^b	<3.0	<6.0 ^b	<6.0 ^b
Calcium	-	65600	41900	<25000 ^b	69700 ^b	97800 ^b	40200 ^b	8330	<25000 ^b	95400	83000	-	18800	37900	59300 ^b	71100	62500 ^b	32600 ^b
Chromium	50	<10	31.2	154 ^b	143 ^b	405 ^b	165 ^b	61.7	151 ^b	74	16.1	-	42.4	74	417 ^b	<10	105 ^b	115 ^b
Cobalt	-	<50	<50	<250 ^b	<250 ^b	<500 ^b	<250 ^b	<50	<250 ^b	<50	<50	-	<50	<50	<500 ^b	<50	<100 ^b	<100 ^b
Copper	200	<10	15.7	66.5 ^b	53.5 ^b	278 ^b	53.0 ^b	15.5	<50 ^b	17.4	<10	-	<10	15.8	301 ^b	<10	34.4 ^b	29.4 ^b
Iron	300	4540	39300	122000 ^b	118000 ^b	341000 ^b	95900 ^b	18900	68300 ^b	34600	3510	-	10300	38900	323000 ^b	6080	48800 ^b	68800 ^b
Lead	25	<3.0	12.5	48.5 ^b	38.5 ^b	119 ^b	26.5 ^b	5.8	41.5 ^b	13.5 ^a	<3.0	-	<3.0	7.0 ^f	116 ^b	<3.0	14.5 ^b	29.4 ^b
Magnesium	-	6890	8400	<25000 ^b	55500 ^b	<50000 ^b	<25000 ^b	6970	<25000 ^b	8070	7310	-	<5000	11800	<50000 ^b	26800	13900 ^b	25500 ^b
Manganese	300	162	276	1900 ^b	1350 ^b	2940 ^b	2820 ^b	231	355 ^b	232	53.2	-	490	591	2510 ^b	137	1030 ^b	738 ^b
Mercury	0.7	<0.20	<0.20	<0.20	<0.20	<0.60 ^b	<0.60 ^b	<0.20	<0.60 ^b	<0.20	<0.20	-	<0.20	<0.20	<0.60 ^b	<0.20	<0.20	<0.20
Nickel	100	<10	15	74.5 ^b	71.5 ^b	311 ^b	68.5 ^b	22	349 ^b	19.7	<10	-	<10	25.8	225 ^b	<10	38.2 ^b	74.4 ^b
Potassium	-	<10000	<10000	<50000 ^b	<50000 ^b	<100000 ^b	<50000 ^b	<10000	<50000 ^b	<10000	<10000	-	<10000	<10000	<100000 ^b	14000	<20000 ^b	<20000 ^b
Selenium	10	<10	<10	<50 ^b	<50 ^b	<100 ^b	<50 ^b	<10	<50 ^b	<10	<10	-	<10	<10	<100 ^b	<10	<20 ^b	<20 ^b
Silver	50	<10	<10	<50 ^b	<50 ^b	<100 ^b	<50 ^b	<10	<50 ^b	<10	<10	-	<10	<10	<100 ^b	<10	<20 ^b	<20 ^b
Sodium	20000	36900	19100	83300 ^b	68400 ^b	<100000 ^b	132000 ^b	84700	65300 ^b	66900	61500	-	113000	25100	<100000 ^b	174000	138000 ^b	30500 ^b
Thallium	-	<10	<10	<50 ^b	<50 ^b	<100 ^b	<50 ^b	<10	<50 ^b	<10	<10	-	<10	<10	<100 ^b	<10	<20 ^b	<20 ^b
Vanadium	-	<50	<50	<250 ^b	<250 ^b	613 ^b	<250 ^b	<50	<250 ^b	75.6	<50	-	<50	<50	791 ^b	<50	<100 ^b	104 ^b
Zinc	-	<20	58	302 ^b	245 ^b	505 ^b	170 ^b	35.6	465 ^b	70.5	<20	-	<20	54	515 ^b	<20	94.4 ^b	153 ^b

Notes:
 ND - Non-Detect
 J - Estimated Value
 a Associated CCV outside of c
 b Associated CCV outside of c
 c Associated CCV outside of c
 d Elevated detection limit due to
 e Elevated sample detection limit

Figures



2/14/2020, 9:07:58 AM



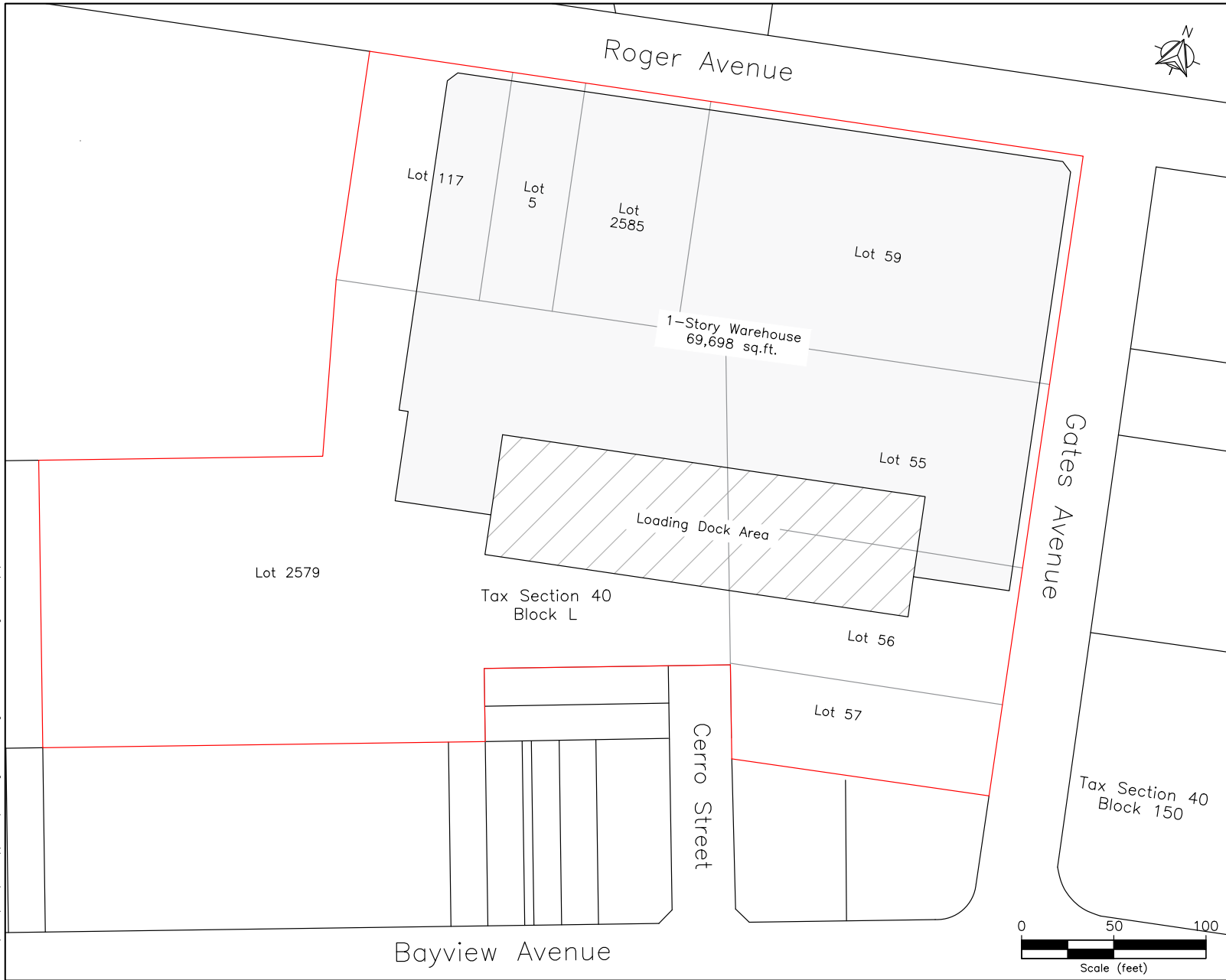
Quadrant 7.5 Minute Topographic Map, published by the USGS, and obtained from National Map Viewer ©2020

FIGURE 1: SITE LOCATION MAP



SITE: 175 Roger Avenue
Inwood, NY, 11096

CLIENT: Inwood 175, LLC & AJM Capital II, LLC



158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, NY 11096
BCP No. 130164

Figure 2

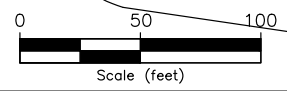
Site Plan

May 2022

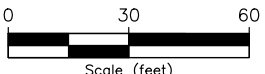
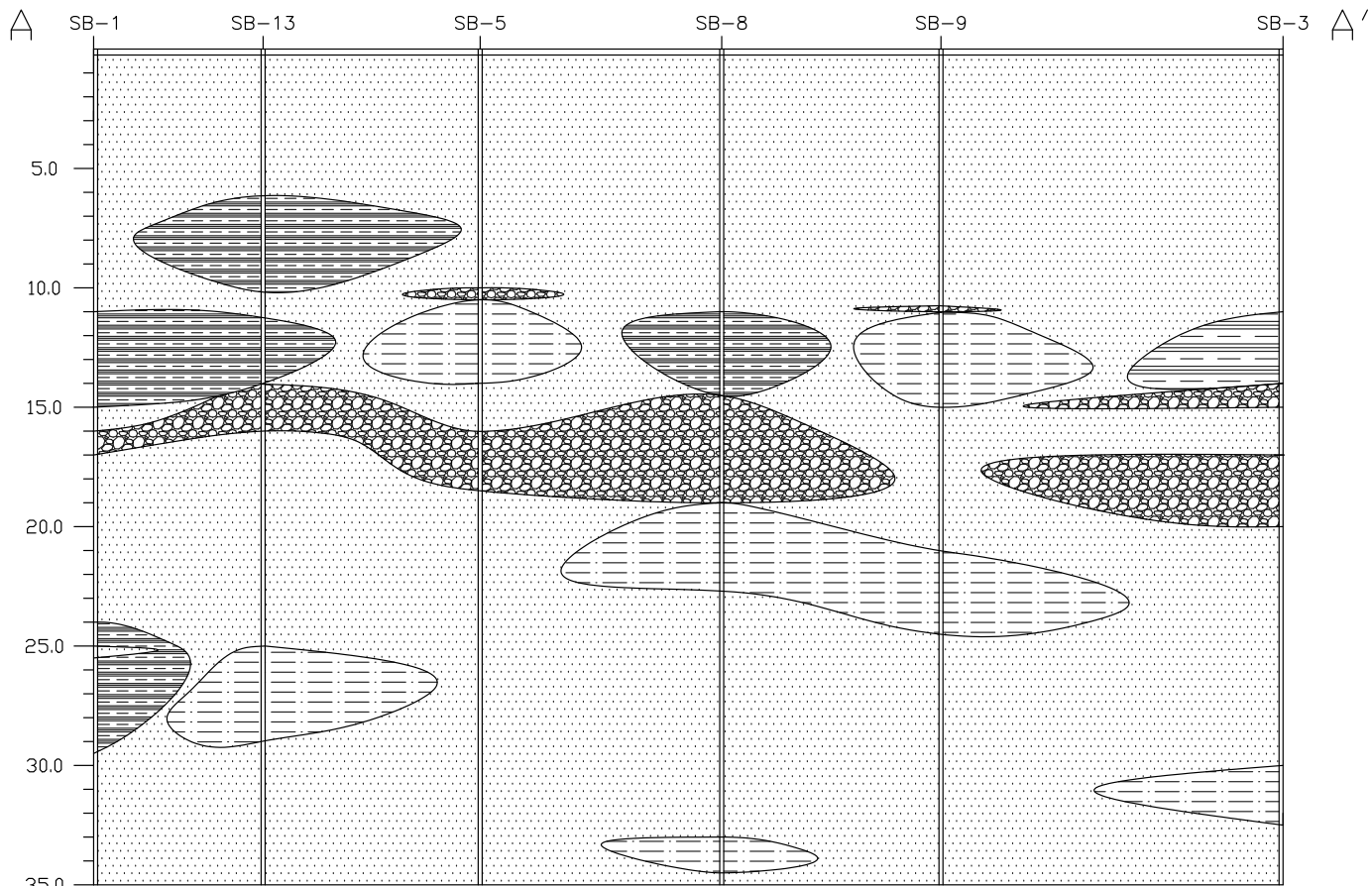
**Project Number
10188-017**

LEGEND

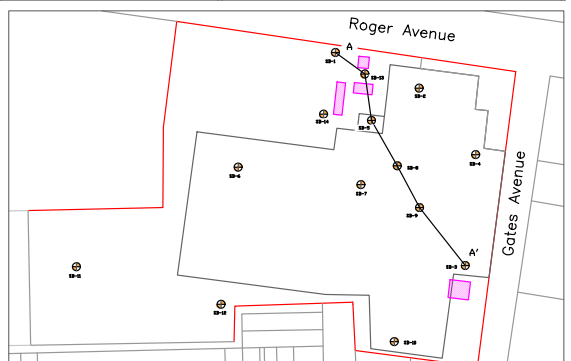
- BCP and Institutional Control Boundary
- Engineering Control Boundary
- Lot Lines



FILE: /Users/ehall/Desktop/Jordan/175 Roger SMP - Figure 3A Cross Section_A-A'.dwg DATE: 5/20/2022



Vertical Exaggeration = 6



158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, N, 11096





Figure 3A

**Geologic
Cross Section
A - A'**

June 2020

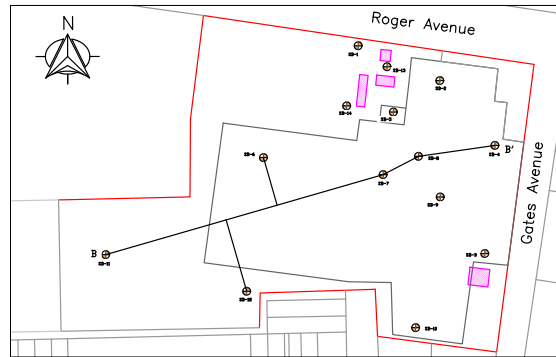
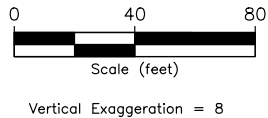
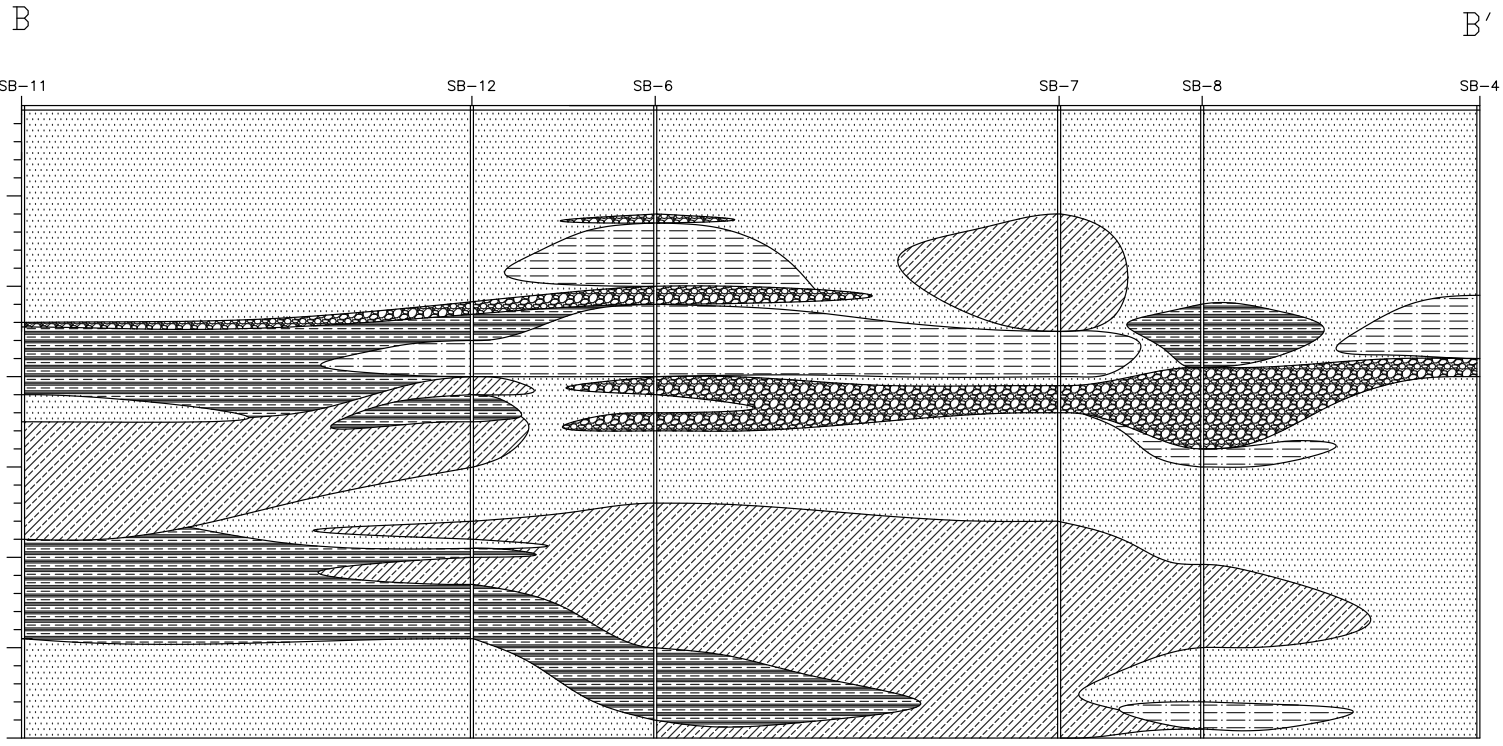
Project Number
10188-017

LEGEND

-  Gravels
-  Sand
-  Silt
-  Clay

Notes:
Data collected 5/20/2020 - 5/29/2020.
Where data and soil descriptions are missing, geology is inferred.

FILE: /Users/ehall/Downloads/175 Roger SMP - Figure 3B Cross Section B-B'.dwg DATE: 5/20/2022



Notes:
Data collected 5/20/2020 - 5/29/2020.
Where data and soil descriptions are missing, geology is inferred.



158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, N, 11096


Figure 3B

**Geologic
Cross Section
B-B'**

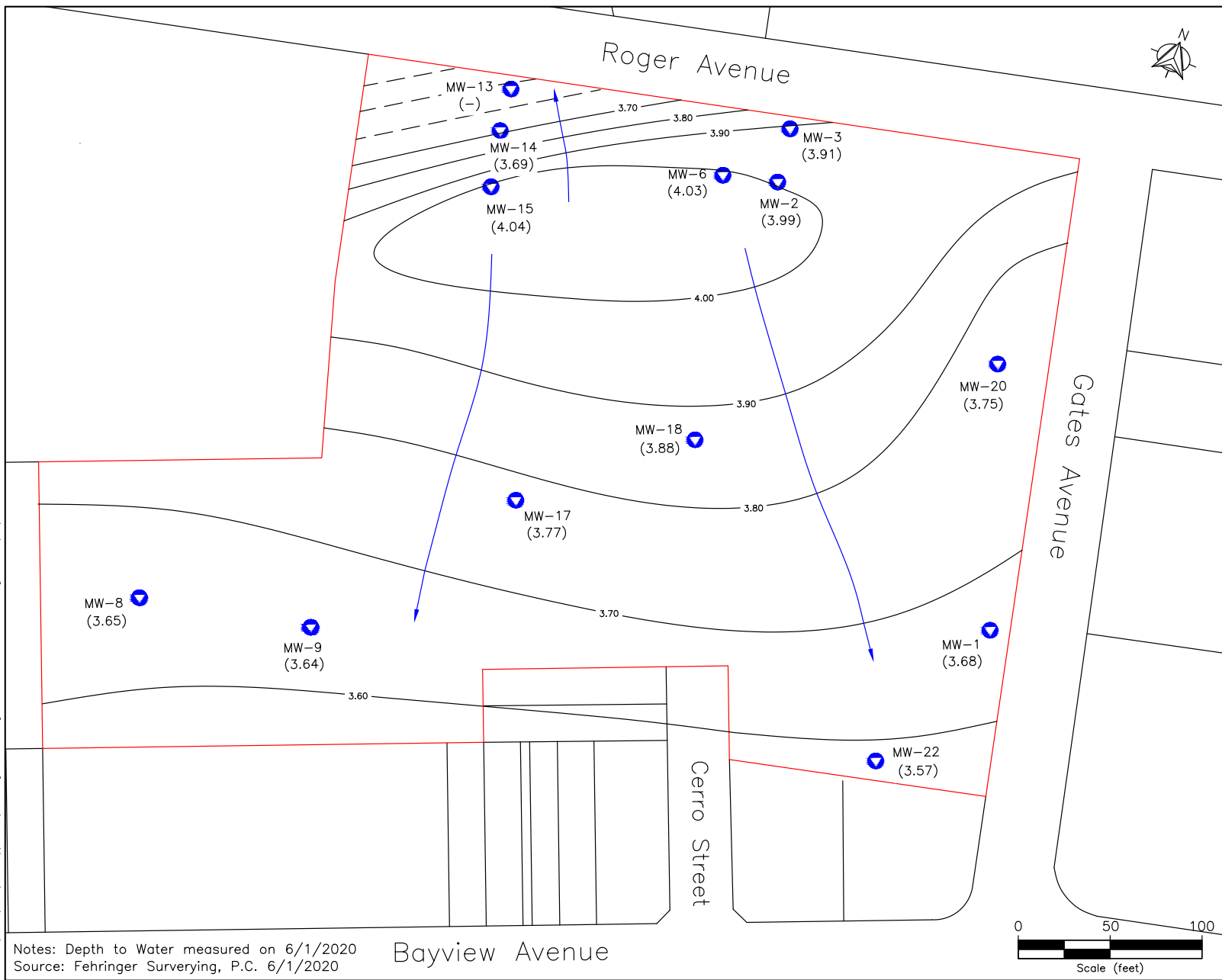
June 2020

Project Number
10188-017

LEGEND

-  Concrete
-  Gravels
-  Sand
-  Silt
-  Clay
-  Clayey/Silty Sand

FILE: /Users/ehall/Desktop/Jordan/175 Roger SMP - Figure 4 Groundwater Contour.dwg DATE: 5/24/2022



158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, NY 11096
BCP No. 130164

Figure 4

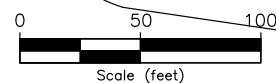
Groundwater Contour Map

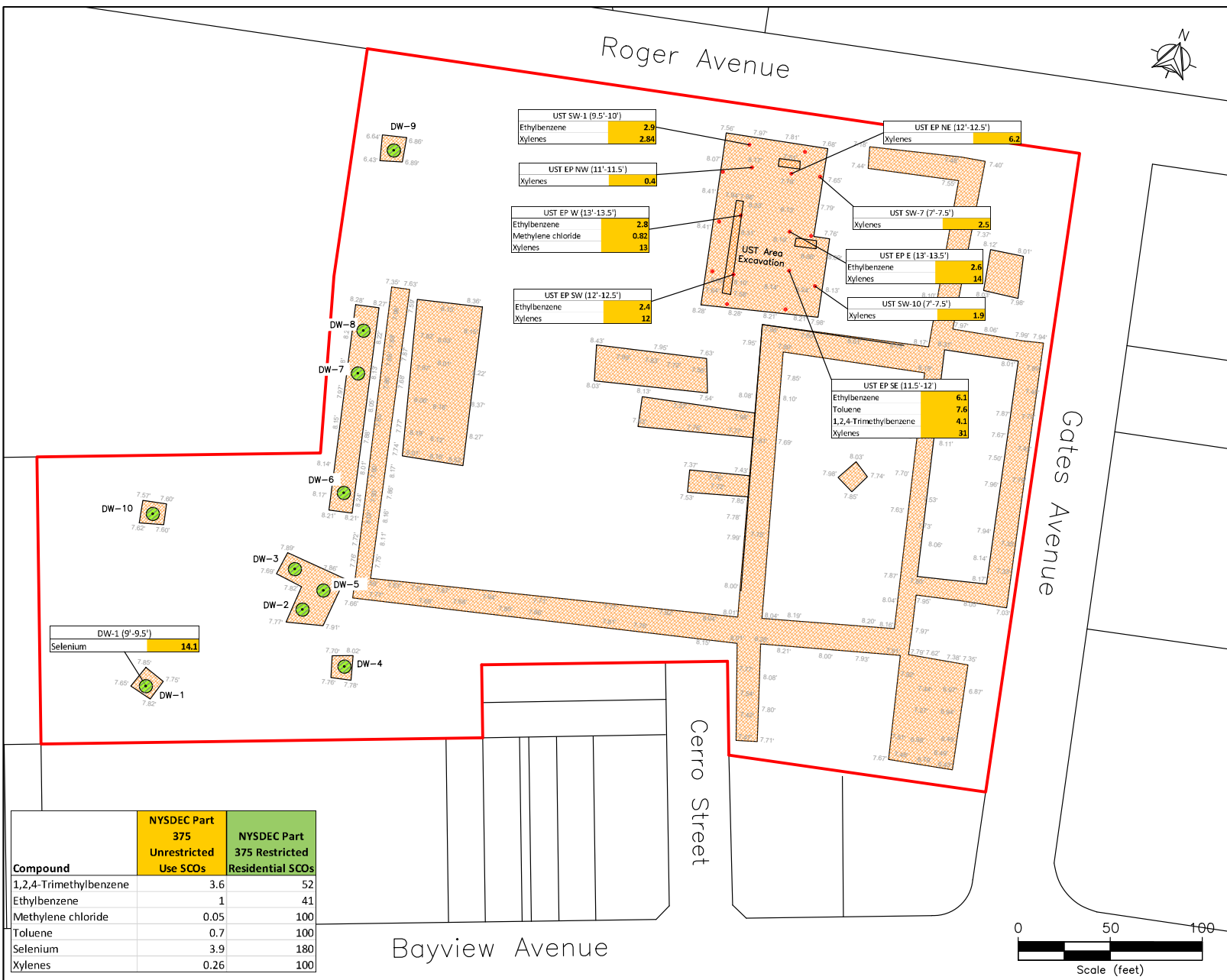
June 2020

Project Number
10188-017

LEGEND

- Site/BCP Boundary
- Lot Lines
- Existing Monitoring Well
- ~ Groundwater Contour
- Flow Direction
- (4.03) Groundwater Elevation





158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, NY 11096
BCP No. 130164

Figure 5

**Post-Remedy Endpoint
Results above
Unrestricted Use SCOs**
All Results Below RRSCOs

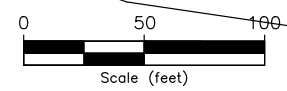
August 2022

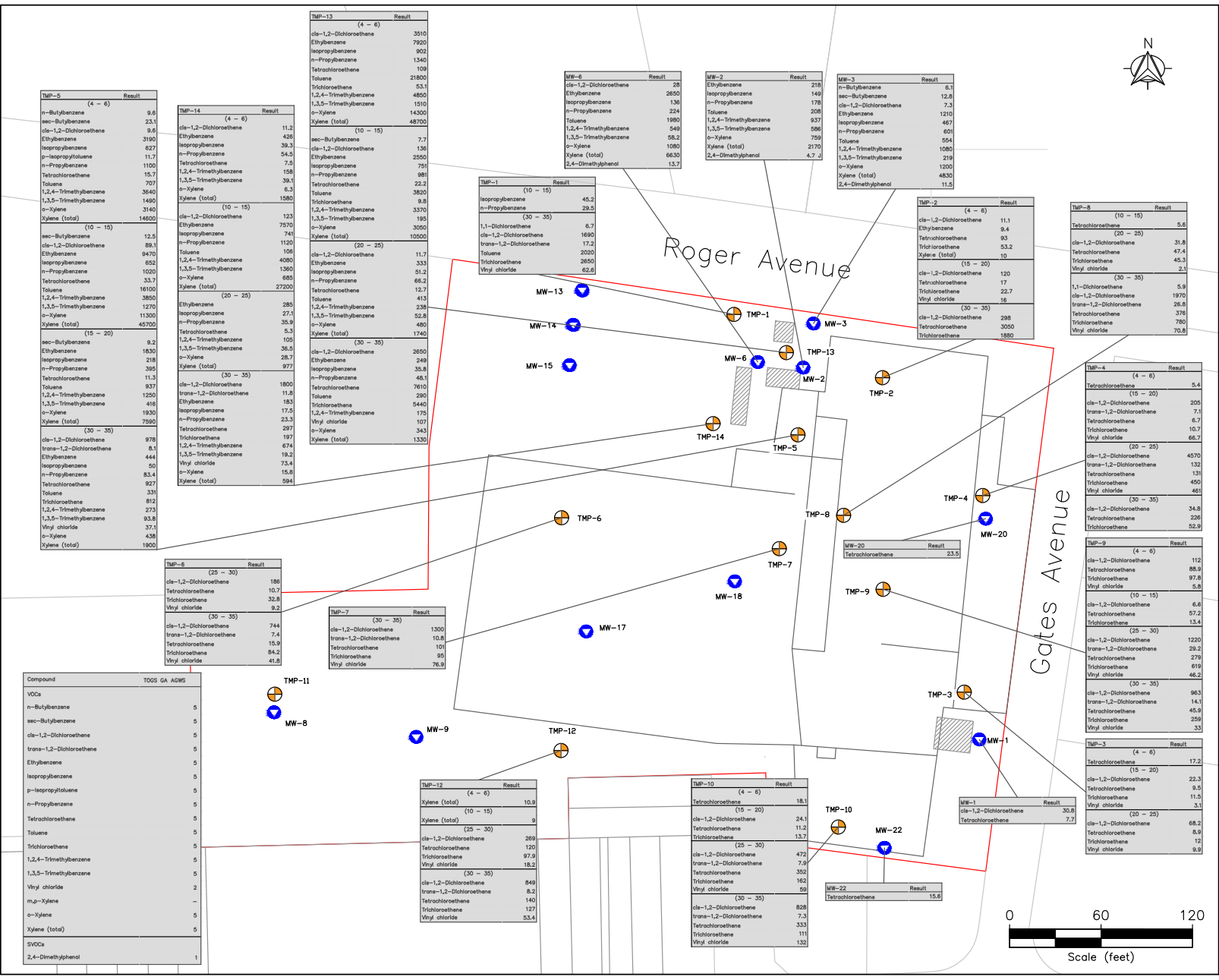
Project Number
10188-017

LEGEND

- BCP and Institutional Control Boundary
- Lot Lines
- Demarcation Layer 2-ft Below Grade
- Dry Well
- End Point Sample
- 7.87' Elevation Feet (NAVD88)

Compound	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Residential SCOs
1,2,4-Trimethylbenzene	3.6	52
Ethylbenzene	1	41
Methylene chloride	0.05	100
Toluene	0.7	100
Selenium	3.9	180
Xylenes	0.26	100





158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, NY, 11096
BCP No. 130164

Figure 6A

Pre-Remediation
Groundwater Results
(µg/ml) above TOGS
GA AWQS

July 2020

Project Number
10188-017

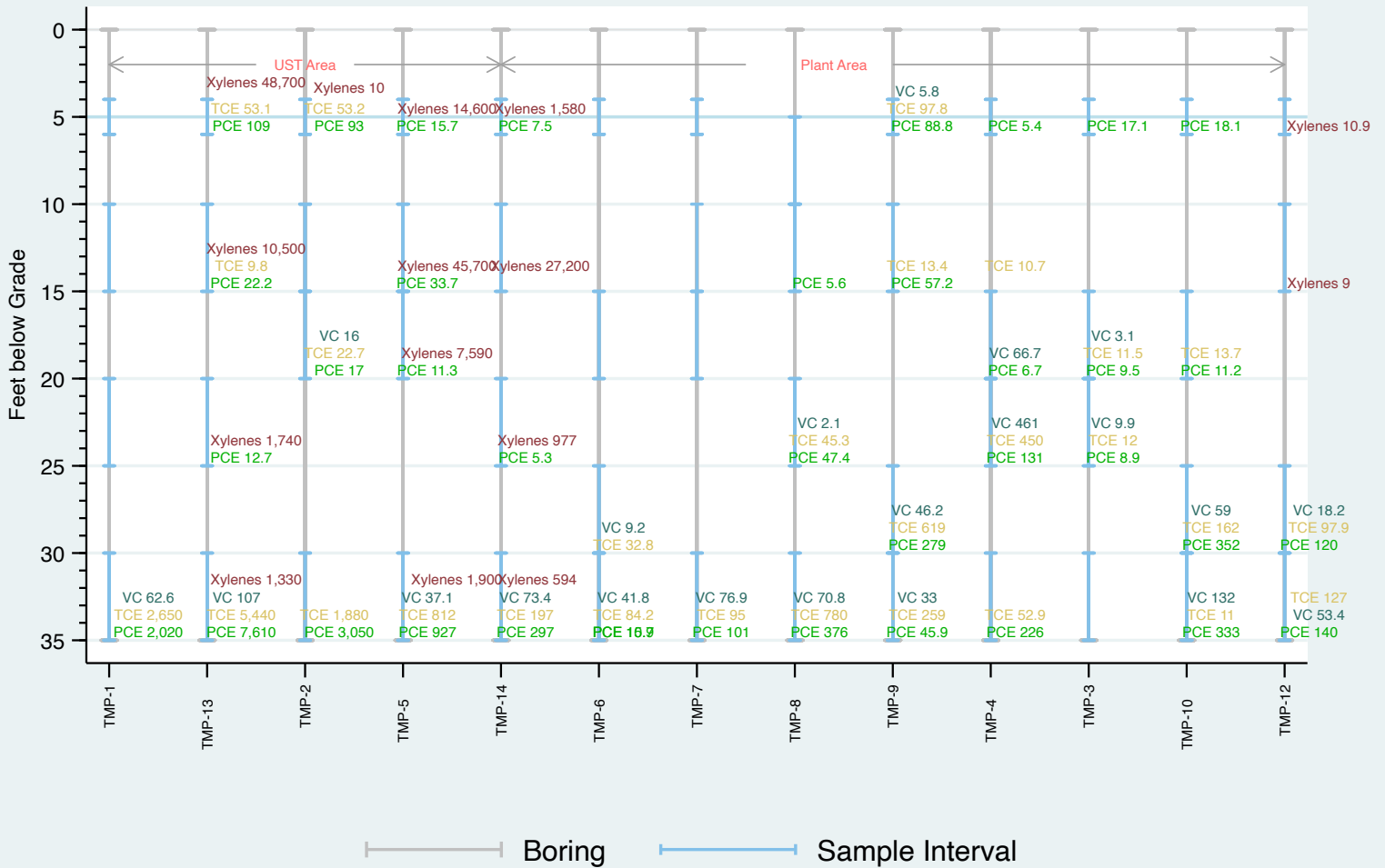
LEGEND

- Tax Lot Boundaries
 - Former Warehouse Building and Room Outlines
 - BCP Boundary
 - Geophysical Anomalies
 - Monitoring Well
 - Temporary Monitoring Well
- (30 - 35) Sample Interval, ft. below grade

Notes:
All values are reported in µg/ml TOGS GA AWQS - Technical and Operational Guidance Series GA Ambient Water Quality Standards
All filtered metals below TOGS
Samples collected 1/9/20 - 1/10/20 and 5/21/20 - 5/29/20
Wells MW-8, MW-9, MW-13, MW-14, MW-15, MW-17 and MW-18 had no exceedances above TOGS GA AWQS
Where no specific TOGS criterion exists, the general guidance value was used.

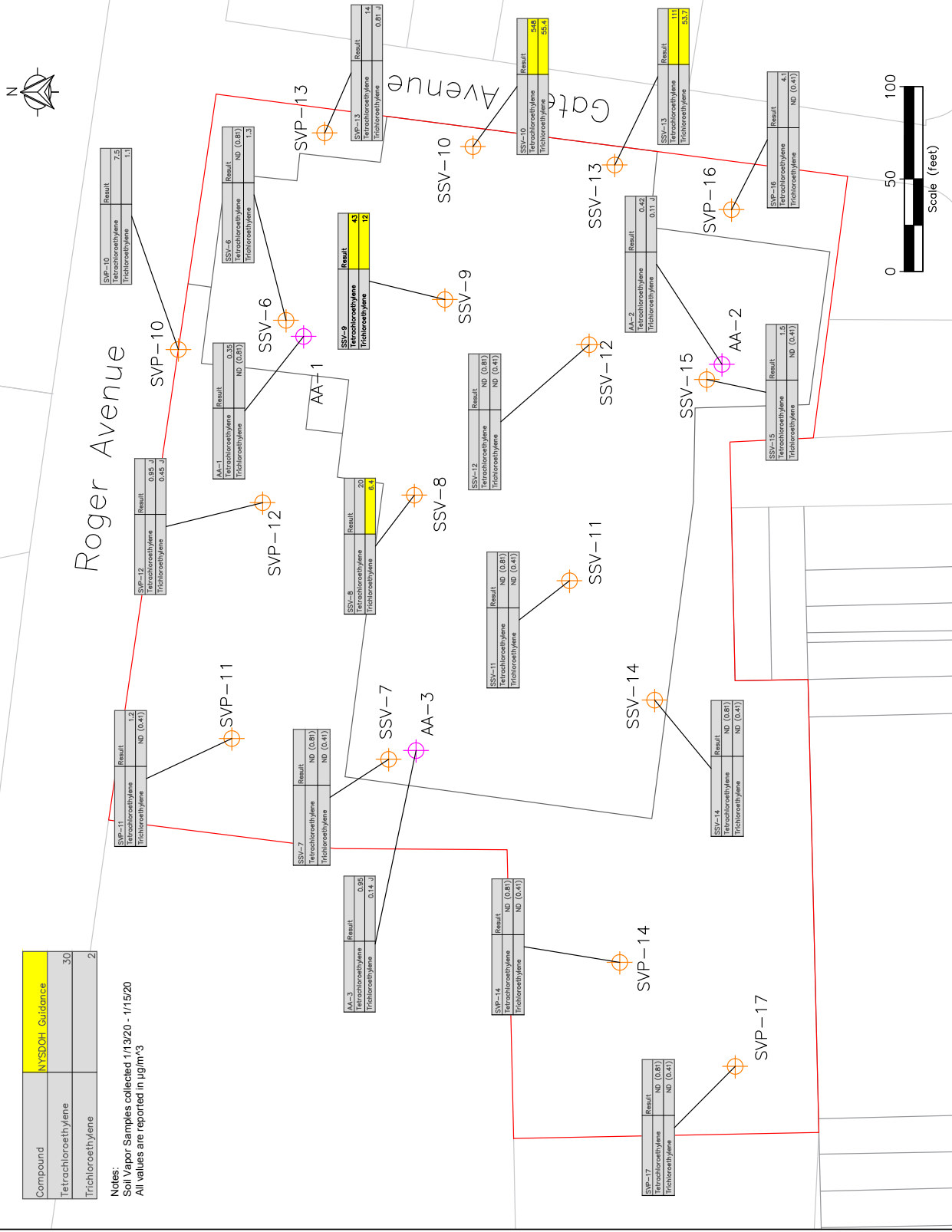
Fig. 6B - Temp. Groundwater Sampling Intervals & Results above TOGS, µg/L

VOCs: PCE, TCE, Vinyl Chloride, & Xylenes



Compound	NYSDOH Guidance
Tetrachloroethylene	30
Trichloroethylene	2

Notes:
 Soil Vapor: Samples collected 1/13/20 - 1/15/20
 All values are reported in $\mu\text{g}/\text{m}^3$



Fleming Lee Shue
 158 West 29th Street, 9th Fl.
 New York, NY 10001

175 Roger Avenue
 Inwood, NY, 11096
 BCP No. 130164

Figure 7

**Pre-Remediation
 Soil Vapor PCE
 and TCE Results
 ($\mu\text{g}/\text{m}^3$)**

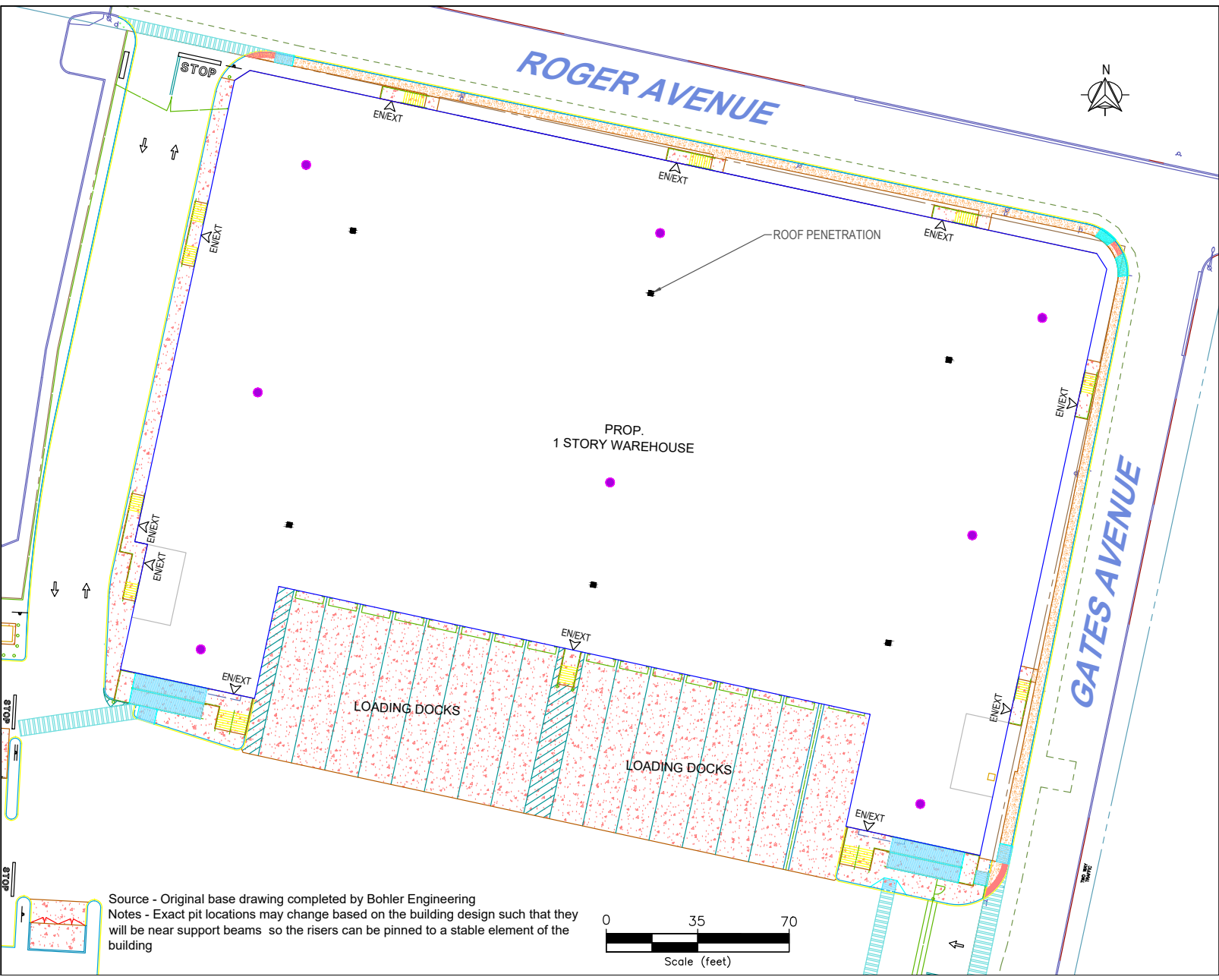
July 2020

**Project Number
 10188-017**

LEGEND

- Tax Lot Boundaries
- Former warehouse Building Outline
- BCP Boundary
- Soil Vapor/Sub-slab Sampling Location
- Ambient Air Sampling Location

FILE: P:\10188 - A.M. Capital\017 - 175 Roger Avenue\Figures\SSDS\6\Preliminary_SSDS Design_v6.dwg DATE: 10/13/2022



Source - Original base drawing completed by Bohler Engineering
 Notes - Exact pit locations may change based on the building design such that they will be near support beams so the risers can be pinned to a stable element of the building



158 West 29th Street, 9th Fl.
 New York, NY 10001

175 Roger Avenue
 Inwood, NY


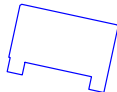

Figure 8A

SSDS Design

Septmeber 2022

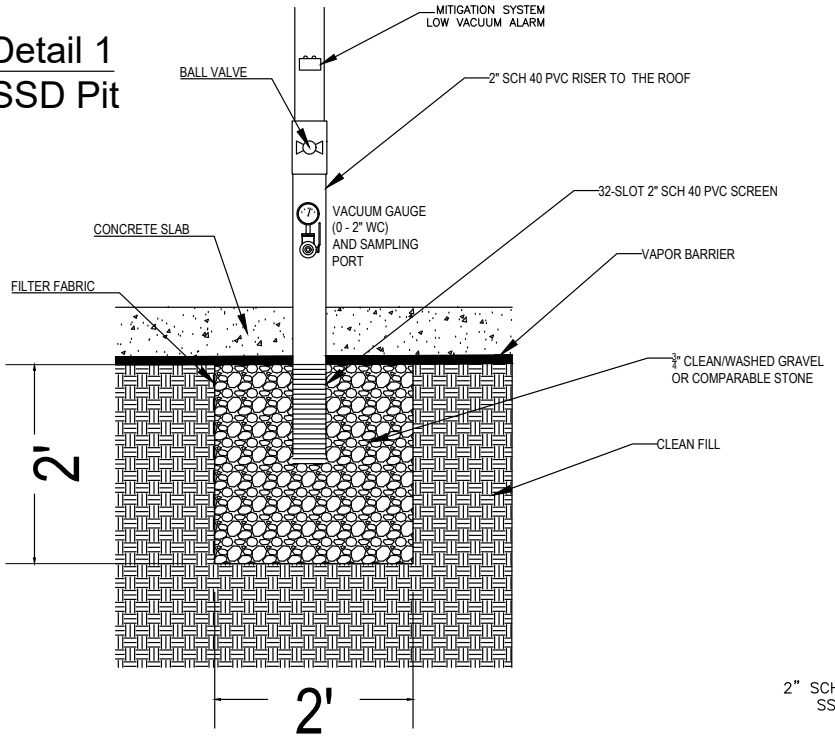
Project Number
10188-017

LEGEND

-  SSDS Pit
-  1 Story Warehouse
-  Monitoring Point

FILE: P:\10188 - A.M. Capital\017 - 175 Roger\Figures\SSDS\5\Preliminary SSDS Design - 6.dwg DATE: 10/13/2022

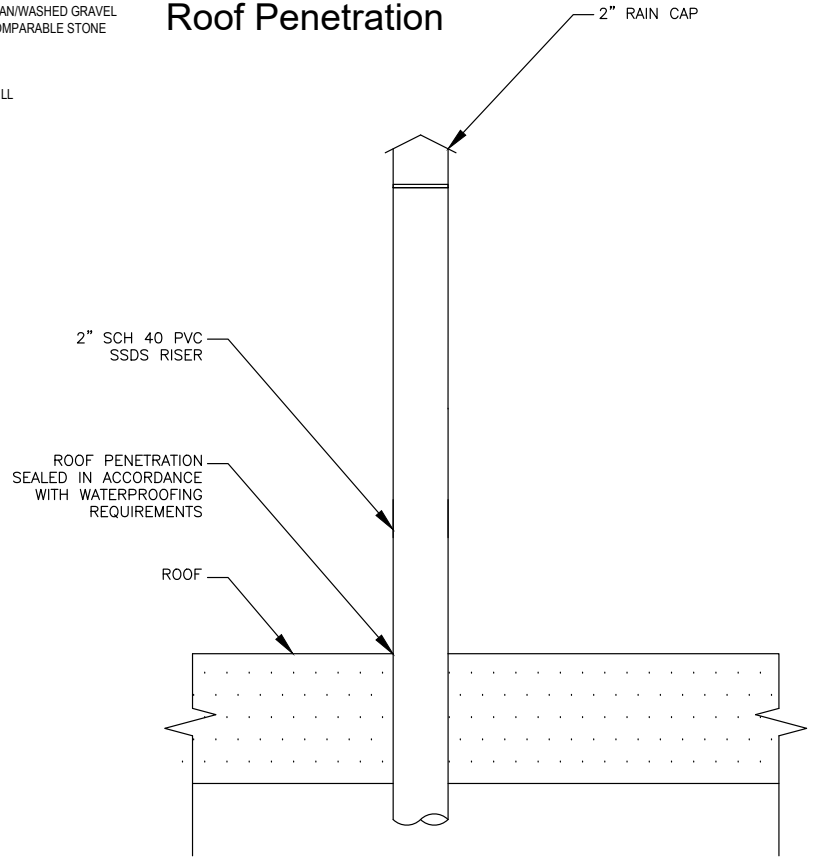
Detail 1 SSD Pit



- NOTES:**
1. DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL, OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
 2. CONTRACTOR TO VERIFY THAT VENT STACK EXHAUST LOCATION IS A DISTANCE OF 10 FEET OR MORE FROM ANY FRESH AIR INTAKES OR OPERABLE WINDOWS (INCLUDING THOSE ON ADJOINING PROPERTIES). FINAL LOCATION AND HEIGHT OF VENT STACKS SHALL BE IN ACCORDANCE WITH LOCAL APPLICABLE BUILDING CODE.
 3. VENT STACK SHALL BE SECURELY ANCHORED WITH ADEQUATE STRUCTURAL SUPPORTS.
 4. IF A CONFLICT ARISES BETWEEN THE SSDS PIPING AND STRUCTURAL, ARCHITECTURAL, OR MEP ELEMENTS OF THE BUILDING, THE SSDS PIPING CAN BE REALIGNED AS NECESSARY TO AVOID THE CONFLICT. SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO INSTALLATION.
 5. CONTRACTOR TO COORDINATE INSTALLATION OF SSDS ROOF PENETRATION PRIOR TO WATERPROOFING OF THE ROOF.
 6. SYSTEM IS DESIGNED TO BE PASSIVE. IF AN ACTIVE SSDS IS REQUIRED, A RADON BLOWER WILL BE INSTALLED ON THE ROOF OF EACH VERTICAL RISER. VACUUM GAUGE AND ALARM INSTALLATION ARE ALSO CONTINGENT ON THE SYSTEM BEING CONVERTED TO ACTIVE.

*Not to scale
 **Vacuum gauge and alarm installation are contingent on system being activated

Detail 2 Roof Penetration



158 West 29th Street, 9th Fl.
 New York, NY 10001

175 Roger Avenue
 Inwood, NY

Figure 8B

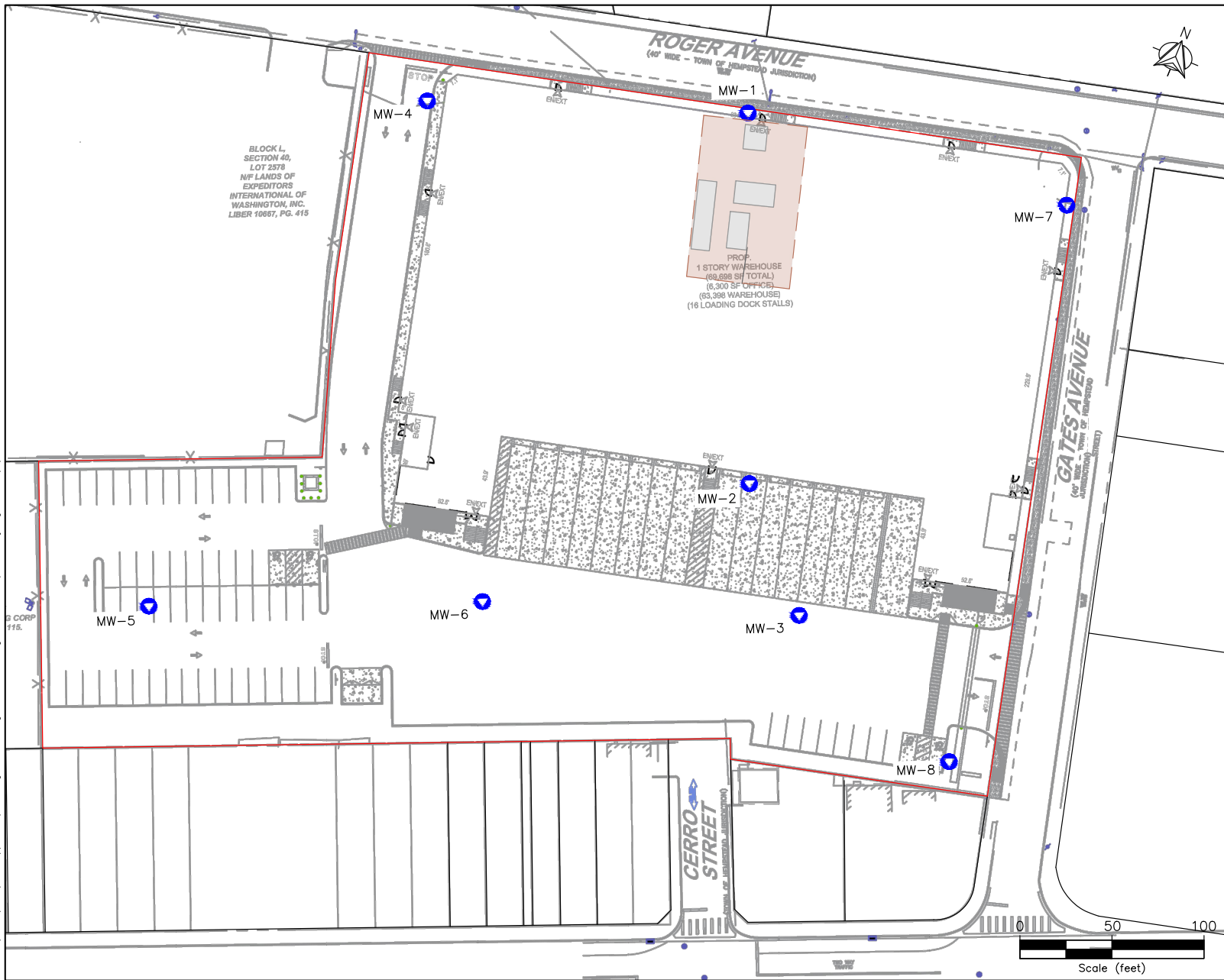
Typical SSDS Details

September 2022

Project Number
10188-017

LEGEND

Legend content area



158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, NY 11096
BCP No. 130164

Figure 9

Monitoring Well Network

May 2022

Project Number
10188-017

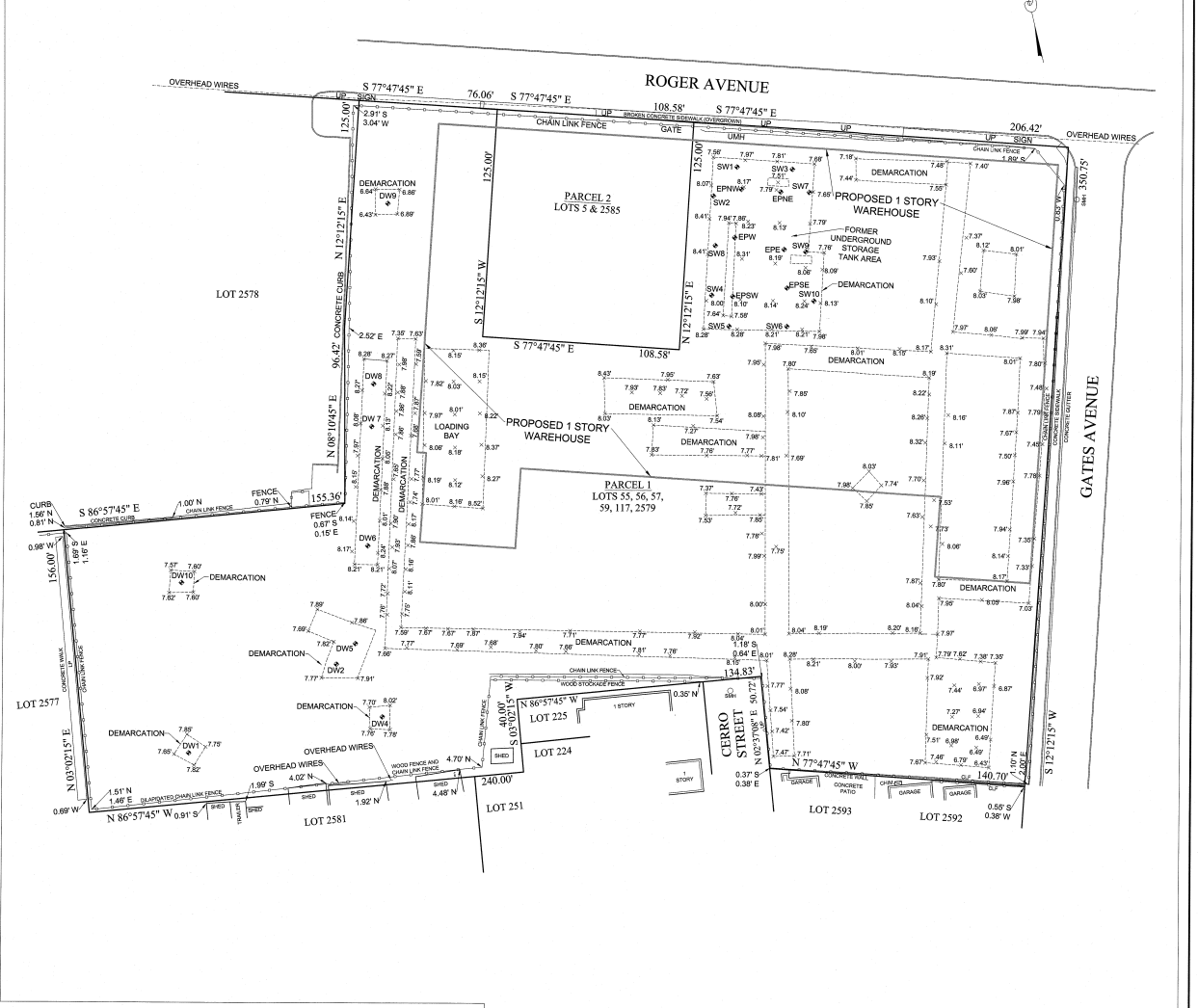
LEGEND

- Site/BCP Boundary
- Lot Lines
- ▼ Nested Monitoring Well
- Former UST Area

APPENDIX A – ENVIRONMENTAL EASEMENT

SECTION: 40
 BLOCK: L
 LOTS:
 5,55,56,57,59,117,
 2579,2585
 TOTAL LOT AREA:
 SQ.FT.:154,987.95
 ACRES: 3.5580

TITLE SURVEY



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

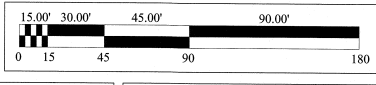
Parcel 1
 ALL that certain plot, piece or parcel of land, with the buildings thereon erected, situate, lying and being at inwood, Town of Hempstead, County of Nassau and State of New York, more particularly bounded and described as follows:
 BEGINNING at the corner formed by the intersection of the southerly side of Roger Avenue with the westerly side of Gates Avenue;
 RUNNING THENCE south 12 degrees 12 minutes 15 seconds West along the westerly side of Gates Avenue 350.75 feet;
 THENCE North 77 degrees 47 minutes 45 seconds West 140.70 feet to the easterly side of Cerro Street;
 THENCE North 2 degrees 37 minutes 08 seconds East along the easterly side of Cerro Street 50.72 feet;
 THENCE North 86 degrees 57 minutes 45 seconds West 134.83 feet;
 THENCE South 3 degrees 02 minutes 15 seconds West 40 feet;
 THENCE North 86 degrees 57 minutes 45 seconds West 240 feet;
 THENCE North 3 degrees 02 minutes 15 seconds East 156 feet;
 THENCE South 86 degrees 57 minutes 45 seconds East 155.36 feet;
 THENCE North 8 degrees 10 minutes 45 seconds East 96.42 feet;
 THENCE North 12 degrees 12 minutes 15 seconds East 125 feet to the southerly side of Roger Avenue;
 THENCE South 77 degrees 47 minutes 45 seconds East along the southerly side of Roger Avenue 76.06 feet to the Land now or formerly of Vandever;
 THENCE South 12 degrees 12 minutes 15 seconds West along the preceding land 125 feet;
 THENCE North 12 degrees 12 minutes 15 seconds East 125 feet to the Southerly side of Roger Avenue;
 THENCE South 77 degrees 47 minutes 45 seconds East along the Southerly side of Roger Avenue, 206.42 feet to the point or Place of BEGINNING.

NOTE:
 WAREHOUSE CONCRETE FLOOR SLAB (7 INCHES) AS PROTECTIVE COVER SSD INSTALLED BENEATH WAREHOUSE SLAB.
 DEMARCATION BARRIERS INSTALLED TWO FEET BELOW GRADE WHERE SHOWN
 ENVIRONMENTAL EASEMENT COVERS THE ENTIRE SITE BOUNDARY.
 ELEVATIONS ARE IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD8S)
 HORIZONTAL COORDINATES ARE IN THE NORTH AMERICAN DATUM OF 1983 (NAD83), LONG ISLAND ZONE

Northing	Easting	Elevation	Latitude	Longitude	Description
163259.908	1051259.779	7.71	40.614334	73.758642	DW1
163308.909	1051340.796	7.66	40.614668	73.758349	DW2
163280.082	1051360.261	7.75	40.614508	73.758258	DW4
163320.237	1051351.218	7.77	40.614699	73.758312	DW5
163373.938	1051357.693	8.21	40.614846	73.758288	DW6
163439.433	1051358.442	7.93	40.615026	73.758291	DW7
163482.815	1051360.343	8.09	40.615090	73.758277	DW8
163561.803	1051368.069	6.69	40.615362	73.758249	DW9
163353.471	1051255.229	7.38	40.614791	73.758657	DW10
163361.989	1051560.289	7.62	40.615415	73.757556	UST SW1
163366.059	1051547.191	7.75	40.615372	73.757603	UST SW2
163380.814	1051590.684	7.33	40.615412	73.757446	UST SW3
163511.576	1051546.317	7.79	40.615222	73.757607	UST SW4
163494.556	1051555.902	7.75	40.615176	73.757573	UST SW5
163494.526	1051557.762	7.96	40.615175	73.757458	UST SW6
163566.107	1051600.015	7.35	40.615377	73.757413	UST SW7
163539.026	1051548.259	8.05	40.615298	73.757600	UST SW8
163535.601	1051598.086	7.70	40.615288	73.757420	UST SW9
163508.550	1051602.609	7.94	40.615214	73.757404	UST SW10
163510.885	1051557.971	7.92	40.615220	73.757865	UST EPSW
163515.614	1051587.867	7.83	40.615233	73.757454	UST EPSW
163543.184	1051568.010	7.88	40.615309	73.757561	UST EPW
163536.881	1051585.252	7.82	40.615291	73.757463	UST EP E
163569.686	1051562.695	7.89	40.615382	73.757547	UST EPNW
163568.258	1051584.395	7.42	40.615378	73.757469	UST EPNE

UPDATED: SEPTEMBER 15, 2022
 REVISED: JUNE 30, 2020

DRAWN BY: MF



SURVEY OF PROPERTY SITUATED IN:
 175 ROGER AVENUE
 TOWN OF INWOOD
 COUNTY OF NASSAU
 STATE OF NEW YORK

FEHRINGER SURVEYING, P.C.
 ROBERT FEHRINGER
 LICENSED LAND SURVEYOR
 WWW.FEHRINGERSURVEYING.COM
 2300 JACKSON AVENUE
 SEAFORD, NY 11589
 (516) 763-5511 FAX NO. (516) 763-5525
 P@FEHRINGERSURVEYING.COM

**** Electronically Filed Document ****

Instrument Number: 2022-113175

Recorded As: EX-D06 - DEED AGREEM

Recorded On: November 29, 2022

Recorded At: 09:54:59 am Receipt Number: 2748948

Number of Pages: 10 Processed By: 001 MNC

Book-VI/Pg: Bk-D VI-14324 Pg-707

Total Rec Fee(s): \$395.00

** Examined and Charged as Follows **

06 - DEED AGREEMENT	\$ 90.00	EX-Blocks - Deeds - \$300	\$ 300.00	EX-TP-584 Affidavit Fee	\$ 5.00
---------------------	----------	---------------------------	-----------	-------------------------	---------

	Tax Amount	Consid Amt	RS#/CS#		
Tax-Transfer	\$ 0	\$ 0	RE 9127	Basic	\$ 0.00
HEMPSTEAD				Local NY CITY	\$ 0.00
				Additional MTA	\$ 0.00
				Spec ASST	\$ 0.00
				Spec ADDL SONYMA	\$ 0.00
				Transfer	\$ 0.00

Tax Charge: \$ 0

Property Information:

Section	Block	Lot	Unit	Town Name

40	L	117		HEMPSTEAD
40	L	2579		HEMPSTEAD
40	L	2585		HEMPSTEAD
40	L	5		HEMPSTEAD
40	L	55		HEMPSTEAD
40	L	56		HEMPSTEAD
40	L	57		HEMPSTEAD
40	L	59		HEMPSTEAD

*****THIS PAGE IS PART OF THE INSTRUMENT*****

Any provision herein which restricts the Sale, Rental or use of the described REAL PROPERTY because of color or race is invalid and unenforceable under federal law.



Maureen O'Connell
County Clerk Maureen O'Connell

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

THIS INDENTURE made this 2nd day of November, 2022, between Owner, Inwood 175, LLC, having an office at 175 ROGER AVE, INWOOD, NY 11096 State of New York (the "Grantor"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

WHEREAS, Grantor, is the owner of real property located at the address of 175 Roger Avenue in the City of Inwood, County of Nassau and State of New York, known and designated on the tax map of the County Clerk of Nassau as tax map parcel numbers: 40-L-5; 40-L-55; 40-L-56; 40-L-57; 40-L-59; 40-L-117; 40-L-2579; 40-L-2585, being the same as that property conveyed to Grantor by deed dated May 23, 2022 and recorded in the Nassau County Clerk's Office in Book D, Volume 14258, Page 344. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 3.5537 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 18, 2022 prepared by Gregory S. Gallas, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

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

Sochen
40
Block
L
LOTS
5,
55,
56,
57,
59,
117,
2579,
2585

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: C130164-07-19, 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 Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

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

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

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

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

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

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

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

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

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

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

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

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

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

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

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

(2) the institutional controls and/or engineering controls employed at such site:
(i) are in-place;
(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

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

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a

defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

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

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

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

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

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

Parties shall address correspondence to: Site Number: C130164
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to: Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

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

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

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

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


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

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

Remainder of Page Intentionally Left Blank

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

Inwood 175, LLC:

By: 

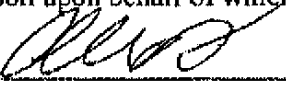
Print Name: Adam Mann

Title: Authorized Signatory Date: 10/13/22

Grantor's Acknowledgment

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

On the 13th day of October, in the year 2022, before me, the undersigned, personally appeared Adam Mann, 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

ALEX SANDS
Notary Public, State of New York
Reg. No. 01SA6398069
Qualified in Nassau County
Commission Expires September 23, 2023

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

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

Grantee's Acknowledgment

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

On the 2nd 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.

Jennifer Andaloro
Notary Public - State of New York

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN5196246
Qualified in Albany County
Commission Expires January 14, 2024

SCHEDULE "A" PROPERTY DESCRIPTION

ALL that certain plot, piece or parcel of land with the buildings, and improvements thereon erected, situate at Inwood, Town of Hempstead, County of Nassau and State of New York being more particularly bounded and described as follows:

BEGINNING at corner formed by the intersection of the southerly line of Roger Avenue with the westerly line of Gates Avenue (a/k/a Gafer Street);

RUNNING THENCE South 12 degrees 12 minutes 15 seconds west, along the westerly line of Gates Avenue, 350.75 feet to a point;

THENCE North 77 degrees 47 minutes 45 seconds west, 140.70 feet to a point in the easterly line of Cerro Street;

THENCE, North 02 degrees 37 minutes 08 seconds east, along the easterly line of Cerro Street, 50.87 feet to the northerly terminus of Cerro Street;

THENCE North 86 degrees 57 minutes 45 seconds west, along the said northerly terminus of Cerro Street and along the northerly line of Section 40, Block L, Lot 225 on the Land and Tax Map of Nassau County, 133.48 feet to a point;

THENCE South 03 degrees 02 minutes 15 seconds west, 40.00 feet to a point;

THENCE North 86 degrees 57 minutes 45 seconds west, 240.00 feet to a point;

THENCE North 03 degrees 02 minutes 15 seconds east, 156.00 feet to a point;

THENCE South 86 degrees 57 minutes 45 seconds east, 154.03 feet to a point;

THENCE North 08 degrees 10 minutes 45 seconds east, 96.27 feet to a point;

THENCE North 12 degrees 12 minutes 15 seconds east, 125.00 feet to a point in the southerly line of Roger Avenue; and,

RUNNING THENCE South 77 degrees 47 minutes 45 seconds east, 391.06 feet to the first above mentioned corner the point and place of BEGINNING.

For Information Only:

Premises commonly known as 175 Roger Avenue, Inwood, NY 11906

Section 40 Block L Lots 5, 55-57, 59, 117, 2579 and 2585

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Remedial Party Inwood 175, LLC & AJM Capital II, LLC	(516) 637-2525, adam@ajmre.com
Site Owner Inwood 175, LLC	516) 637-2525, adam@ajmre.com
Jordan Arey, Qualified Environmental Professional	(212) 675-3225 jordan@flemingleeshue.com
Arnold F. Fleming, Remedial Engineer	(212) 675-3225 arnie@flemingleeshue.com
John Sheehan, NYSDEC DER Project Manager	631) 444-0244; john.shehan@dec.ny.gov
Chris Engelhardt, NYSDEC DER Project Manager's Supervisor	(631) 444-0235, chris.engelhardt@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	(518) 402-9569; Kelly.lewandowski@dec.ny.gov
Dan Tucholski, NYSDOH Project Manager	(518) 486-7016; Daniel.Tucholski@health.ny.gov
Christine Leas, Remedial Party Attorney	(646) 378-726; cleas@sprlaw.com

APPENDIX C
SOIL BORING LOGS

Soil Boring ID: SB-1
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/20/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	0-0.5'	CONCRETE / FILL	SB-1 (4 - 5)
			2.3'	0.5-1.5' dark brown, organic very fine SAND, non-plastic, dry 1.5-5' red-brown, fine to medium SAND with trace silt, non-plastic, dry	
	0.3		3.0'	5-5.5' grey-brown very fine SAND with silt and clay, slightly plastic, saturated	
	0.0			5.5-10' grey-brown very fine to fine SAND, non-plastic, some black staining at 7.5' bgs	
	0.3				
10	0.0		3.5	10-11' grey very fine to fine SAND, non-plastic 11-15' grey / dark grey CLAY, slight staining, very plastic, very dense	SB-1 (11 - 12)
	0.0		4.0'	15-16' grey very fine to fine SAND, non-plastic 16-17' rounded to sub-rounded PEBBLES in grey fine sand matrix 17-18' grey very fine to fine SAND, trace silt, non-plastic 18-20' grey-brown very fine to fine SAND, trace silt, non-plastic	SB-1 (14-15)
	0.3				
20	0.0		5.0'	20-24' red-brown, very fine to fine SAND, trace silt and clay, slightly plastic, very compact	SB-1 (25 - 26)
	0.0		5.0'	24-25' red-brown CLAY with sand, very plastic 25-25.5' red-brown fine to medium SAND, trace clay, slightly plastic 25.5-29.5' dark grey CLAY with some sand, plastic	SB-1 (28.5 - 29.5)
	0.4				
				29.5-30 dark grey fine SAND, non-plastic, compact	
30			5	30-35' same as above	SB-1 (34 - 35)
				END OF BORING - 35'	

Date: 6/2/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-2
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/20/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	2.5'	0-0.5' CONCRETE / FILL	SB-2 (4 - 5)
	0.0			0.5-1.5' dark brown, organic very fine SAND and silt, slightly-plastic	
	0.2			1.5-5' red-brown, fine SAND with some pebbles, non-plastic, dry	
	0.0			5-6.5' red-brown fine SAND, non-plastic, saturated	
	16.8			6.5-10' grey / red-brown (mottled), fine to medium SAND, non-plastic	
10	0.0		4.5'	10-10.5' sub-rounded PEBBLES with brown, fine to medium sand matrix	SB-2 (18 - 19)
	0.0			10.5-14' grey / red-brown (mottled) CLAY with some sand, very plastic	
	0.0			14-15' sub-rounded PEBBLES with red-brown, fine sandy clay matrix	
	0.0			15-16' red-brown, very fine to fine SAND, non-plastic, compact	
	0.5			16-17.5' sub-rounded PEBBLES with brown fine sandy matrix 17.5-20' red-brown, fine SAND, non-plastic, compact	
20	0.9		5.0'	20-21' red-brown, very fine to fine SAND, trace silt and clay, slightly plastic, very compact	SB-2 (20.5 - 21.5)
	11.0			21-23.5' red-brown, sandy SILT, trace clay, very plastic	
				23.5-24.5' red-brown, very fine SAND, non-plastic, very compact	
	0.0			24.5-25' grey, very fine SAND, non-plastic	
				25-27' grey-brown, fine to medium SAND, non-plastic	
30	0.2		5	27-29' grey CLAY, very plastic, very compact	SB-2 (29 - 30)
	4.0			29.5-30 dark grey fine SAND, non-plastic, compact	
				30-35' same as above	
				END OF BORING - 35'	SB-2 (34 - 35)

Date: 6/2/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-3
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/22/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	0-0.5'	CONCRETE / dark brown SAND and silt, organics, dry	SB-3 (5 - 6)
	0.0		2.0'	0.5-5' red-brown, fine SAND, non-plastic, dry	
	0.0		3.0'	5-10' same as above, saturated, pebbles increasing with depth	
10	0.0		4.0'	10-11' same as above 11-14' red-brown, silty CLAY, plastic	SB-3 (15 - 16) SB-3 (15 - 16) DUP
	0.0		5.0'	14-15' sub-rounded PEBBLES with clayey coarse sand matrix 15-17' red-brown fine SAND with silt and clay, plastic	
	0.0		5.0'	17-20' sub-rounded PEBBLES with fine sand matrix, some fine sand lenses	
20	0.0		0.0'	20-25' NO RECOVERY	
	0.0		0.0'	25-30' NO RECOVERY	
	0.0		0.0'		
30	0.0		5.0'	30-32.5' dark grey clayey SILT with some fine sand, slightly plastic to plastic	SB-3 (34 - 35)
	0.2		5.0'	32.5-35' dark grey medium SAND with trace silt, slightly plastic, some brown sand lenses	
				END OF BORING - 35'	

Date: 6/2/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-4
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/21/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	0-0.5'	CONCRETE mixed with some dark brown, fine sand	
	0.0		2.0'	0.5-5' red-brown, medium to coarse SAND with some sub-rounded pebbles, dry	SB-4 (5 - 6)
	0.0		3.0'	5-10' same as above, saturated	SB-4 (7 - 8)
10	0.0		4.5'	10-10.5' same as above, with more sub-rounded pebbles	SB-4 (10 - 14)
	0.0			10.5-13' red-brown clayey SILT with trace fine sand, slightly plastic to plastic	
	0.0			13-14' grey clayey SILT with trace fine sand, slightly plastic to plastic	
	0.0			14-15' sub-rounded PEBBLES with red-brown, coarse sand matrix	SB-4 (15 - 16)
	0.0			15-15.5' red-brown fine SAND with some pebbles and trace silt	
	0.0			15.5-17' same as above, more pebbles	
	0.0		3.0'	17-20' red-brown, coarse SAND with pebbles	
20	0.0		0.0'	20-25' NO RECOVERY	
	0.0		0.0'	25-30' NO RECOVERY	
	0.0		0.0'		
30	0.0		5.0'	30-35' black / dark grey very fine to fine SAND with silt and trace clay, non-plastic	SB-4 (30 - 31)
	0.2				SB-4 (34 - 35)
				END OF BORING - 35'	

Date: 6/2/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-5
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/29/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	1.5'	0-0.5' CONCRETE with dark brown, very fine sand with some organics	SB-5 (6 - 7) SB-5 (7 - 8)
	0.0			0.5-5' red-brown, very fine SAND with some pebbles, non-plastic, dry	
	0.0		5-6' same as above, saturated		
	881.0		6-6.25' dark grey clayey SAND, plastic dark stains, petrol odor		
	1476		6.25-10' grey / red-brown (mottled) clayey SAND, plastic, petrol odor		
	1548				
	1216				
	215.3				
10	50.2		5.0'	10-10.5' sub-rounded PEBBLES with sandy silt matrix, slight petrol odor	SB-5 (10 - 11)
	30.6			10.5-14' light brown clayey SILT, plastic, slight petrol odor	
	25.1		5.0'	14-15' light brown silty SAND, slightly plastic, slight petrol odor	SB-5 (18 - 19)
	10.0			15-16' brown, very fine SAND, non-plastic, no odor	
	1.2		16-18.5' sub-rounded PEBBLES with medium to coarse sand matrix		
	0.0		18.5-19.5' light brown, very fine to fine SAND, non-plastic		
	6.0		5.0'	19.5-20' red-brown, very fine SAND with some clay, slightly plastic	SB-5 (29 - 30)
	4.0			20-21' same as above	
	0.0		21-22.25' red-brown, clayey SAND, plastic		
	2.3		22.25-23' red-brown, loamy SAND, plastic		
	10.2		23-25' red-brown, clayey SAND, plastic		
	12.1		25-30' same as above		
30	0.6		5.0'	30-32.5' same as above	SB-5 (34 - 35) SB-5 (34 - 35) DUP
	2.1			32.5-25' dark grey, clayey SAND, slightly plastic to plastic	
	3.4		END OF BORING - 35'		

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-6
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/27/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	1.0'	0-0.25' CONCRETE	SB-6 (5 - 6)
	0.0			0.25-5' red-brown, fine SAND, non-plastic, dry	
	0.0			5-6' red-brown, fine to medium SAND, non-plastic, saturated	
	0.0		4.0'	6-6.5' sub-rounded PEBBLES with red-brown fine to medium SAND with some clay matrix, slightly plastic	
	0.0			6.5-8.5' red-brown clayey SILT with trace fine sand, plastic	
	0.0			8.5-10' grey / red-brown (mottled) clayey SILT with sand, plastic	
10	0.0		2.0'	10-11' sub-rounded PEBBLES with red-brown, coarse SAND matrix	SB-6 (24 - 25)
	0.0			11-15' light brown, clayey SILT, plastic	
	0.0			15-16' sub-rounded PEBBLES with brown coarse sand and silt matrix	
	0.0	4.0'		16-17' brown, very fine to fine SAND, non-plastic	
	0.0			17-18' sub-rounded PEBBLES in brown fine sand matrix	
	0.0			18-20' red-brown, very fine to fine SAND, non-plastic	
20	0.0		5.0'	20-22' same as above	SB-6 (24 - 25)
	0.0			22-23' red-brown clayey SAND, slightly plastic to plastic	
	0.0			23-25' dark grey, clayey SAND, plastic	
			0.0'	25-30' NO RECOVERY	
30	0.0		5.0'	30-34' dark grey, silty CLAY with sand, very plastic	SB-6 (34 - 35)
	0.0			34-35' dark grey, very fine to fine SAND, non-plastic	
	0.0			END OF BORING - 35'	

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-7
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/26/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0			0.0'	0-5' NO RECOVERY	
	0.0	▼		5-6' red-brown, medium to coarse SAND with some pebbles, non-plastic saturated	SB-7 (5 - 6)
	0.0		2.0'	6-10' dark grey, silty SAND with some pebbles	
	0.0				
10	0.0		5.0'	10-11' same as above	SB-7 (13 - 14)
	0.1			11-12.5' red-brown, silty SAND, slightly plastic	
	0.1			12.5-15' red-brown, clayey SILT, trace sand, plastic	SB-7 (15 - 20)
	0.0		3.5'	15-15.5' brown / grey, very fine to fine SAND, non-plastic	
	0.0			15.5-17' sub-rounded PEBBLES with brown very fine sand matrix	
	0.0			17-20' brown, very fine to fine SAND with some sub-rounded pebbles	
20	0.0		5.0'	20-23' red-brown, very fine to fine SAND with increasing silt to 23', non-plastic	SB-7 (21 - 22) SB-7 (21 - 22) DUP
	0.0			23-25' grey / red-brown (mottled), silty SAND, slightly plastic	
			0.0'	25-30' NO RECOVERY	SB-7 (23 - 24)
30	0.0		5.0'	30-32.5' red-brown, silty SAND, trace clay, slightly plastic	SB-7 (34 - 35)
	0.0			32.5-35' red-brown, silty SAND with clay, slightly plastic to plastic	
	0.0			END OF BORING - 35'	

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-8
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/21/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	2.0'	0-0.25' CONCRETE	SB-8 (5 - 6)
	0.0			0.25-5' red-brown, fine to medium SAND with sub-rounded pebbles, dry	
	0.0			5-10' red-brown, fine SAND with trace silt, non-plastic, saturated	
	0.0		4.0'		
	0.0				
10	0.0		5.0'	10-11' red-brown, fine to coarse SAND with sub-rounded pebbles, non-plastic	SB-8 (10 - 11)
	0.0			11-14.5' red-brown, CLAY with silt and some very fine to fine sand, plastic	SB-8 (11.5 - 12..5)
	0.0			14.5-15' sub-rounded PEBBLES with red-brown coarse sand and clay	
	0.0		4.5'	15-19' same as above	
	0.0			19-20' red-brown clayey SILT with some sand, plastic	SB-8 (18 - 19)
20			0.0'	20-25' NO RECOVERY	
			0.0'	25-30' NO RECOVERY	
30	0.0		5.0'	30-32.5' red-brown, fine SAND, non-plastic	SB-8 (34 - 35)
	0.0			32.5-33' grey, fine SAND, non-plastic	
	0.0			33-34.5' grey, clayey SILT with some fine sand, plastic	
	0.4			34.5-35' black / grey (mottled), fine sand, non-plastic	
				END OF BORING - 35'	

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-9
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/22/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.1	▼	2.0'	0-0.5' CONCRETE / FILL 0.5-5' red-brown, medium to coarse SAND with some pebbles and shell fragments, non-plastic, dry	SB-9 (7 - 8)
	0.0		4.0'	5-6' same as above, non-plastic, saturated 6-10' red-brown to brown, fine SAND, non-plastic	
	0.0				
	0.0				
	0.0				
10	0.0		5.0'	10-10.75' same as above 10.75-11' sub-rounded PEBBLES with red-brown, fine sand matrix 11-14' red-brown clayey SILT, plastic	SB-9 (24 - 25)
	0.0		4.5'	14-15' grey, clayey SILT, plastic 15-19' red-brown, medium to coarse SAND with sub-rounded pebbles, non-plastic	
	0.0				
	0.0			19-20' same as above, with trace silt and clay, non- to slightly plastic	
	0.0			20-21' same as above 21-24.5' red-brown, clayey SILT, plastic	
20	0.3		0.0'	24.5-25' red-brown, silty SAND, non- to slightly plastic	SB-9 (34 - 35)
	0.6		0.0'	25-30' NO RECOVERY	
	0.8		0.0'		
30	1.4		5.0'	30-31.5' red-brown, fine SAND with silt,	SB-9 (34 - 35)
	1.0				
	0.0				
	1.0			END OF BORING - 35'	

Date: 6/3/20

Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-10
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/26/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	0.5'	0-0.5' CONCRETE / FILL 0.5-5' NO RECOVERY	SB-10 (5 - 6)
	0.0		2.5'	5-10' red-brown, very fine to fine SAND, non-plastic, saturated	
	0.0				
	0.0				
	0.0				
10	0.0		5.0'	10-10.5' red-brown silty CLAY, plastic to very plastic 10.5-11' sub-rounded PEBBLES with red-brown, coarse sand matrix 11-15' red-brown, fine SAND, non-plastic	
	0.0		0.0'	15-20' NO RECOVERY	
20	0.0		5.0'	20-21' red-brown, very fine to fine SAND with clay and trace silt, plastic 21-25' red-brown, fine SAND, non-plastic	SB-10 (20 - 25)
	0.0				SB-10 (26 -27)
	0.7		5.0'	25-27' dark grey, fine SAND, with trace silt and clay, slightly plastic	
	0.6				
	0.3			27-30' dark grey, silty CLAY with trace very fine sand, plastic to very plastic	
	0.7				
30	0.5		5.0'	30-35' dark grey / black, fine SAND, with some silt and trace clay, slightly plastic	SB-10 (34 - 35)
	0.7				
	0.3			END OF BORING - 35'	

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-11
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/29/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation	
0	0.0	▼	2.5'	0-0.25' ASPHALT 0.25-5' red-brown, fine SAND, non-plastic, dry	SB-11 (5 - 6)	
	0.0			5-7.5' same as above, saturated		
	0.0			7.5-10' red-brown, coarse SAND, non-plastic		
10	0.0		5.0'	10-12' red-brown, medium SAND, non-plastic		SB-11 (13 - 14)
	0.0			12-12.25' sub-rounded PEBBLES with medium to coarse sand matrix		
	0.0			12.25-14.75' light brown, silty CLAY, plastic to very plastic		
	0.0		14.75-15' light brown, silty CLAY with some sub-rounded pebbles			
	0.0		15-16' same as above			
	0.0	4.0'	16-17.5' red-brown, very fine SAND with sub-rounded pebbles			
	0.0		17.5-20' red / red-brown, clayey, very fine SAND, plastic			
20	0.0		5.0'	20-21.5' same as above 21.5-23' red-brown, clayey, very fine SAND, with some silt, plastic	SB-11 (25 - 30)	
	0.0			23-24' grey / red-brown (mottled) clayey, very fine SAND, plastic		
	0.0			24-25' dark grey, CLAY with some silt, plastic to very plastic		
	0.0			25-25.5' same as above		
	0.0	5.0'		25.5-29.5' dark grey, silty CLAY, plastic to very plastic		
	0.0			29.5-30' dark grey, fine to medium SAND with trace clay, non-plastic		
30				30-35' NO RECOVERY		
			0.0'	Boring advanced an additional 5.0' in an attempt to collect the last sample		
				35-40' NO RECOVERY		
			0.0'	Core washed out in both advances		
				END OF BORING - 40'		

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-12
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/28/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	1.0'	0-1' dark brown, very fine to fine SAND, organics, non-plastic, dry 1-5' red-brown, fine to medium SAND, non-plastic, dry	SB-12 (5 - 6)
	0.0		2.0'	5-10' red-brown / light brown, medium to coarse SAND, non-plastic, saturated	
	0.0				
	0.0				
	0.0				
	0.0				
10	0.0		4.0'	10-11.5' same as above, with some pebbles at 11.5' 11.5-13' red-brown, silty CLAY, with trace sand, plastic to very plastic	SB-12 (14 - 15)
	0.0		4.0'	13-15' grey / red-brown (mottled) clayey SILT, plastic	
	0.0		4.0'	15-16' light brown, silty SAND, slightly plastic	
	0.0		4.0'	16-17.5' red-brown, silty CLAY with sub-rounded pebbles, plastic	
	0.0		4.0'	17.5-20' red-brown, clayey SAND with sub-rounded pebbles, plastic	
	0.0				
20	0.0		5.0'	20-21.5' red-brown, fine SAND with some clay, slightly plastic 21.5-23' red-brown, fine SAND, trace clay, non-plastic	
	0.0		5.0'	23-24' red-brown, silty SAND with some clay, slightly plastic	
	0.0		5.0'	24-24.5' dark grey, fine SAND; 24.5-25' dark grey CLAY	
	0.0		5.0'	25-26.5' dark grey, clayey SAND, plastic	
	0.0		5.0'	26.5-29.5' dark grey, silty CLAY with some sand, plastic to very plastic	
	0.0			29.5-30' dark grey, very fine to fine SAND, non-plastic	
30	0.0		5.0'	30-35' same as above	SB-12 (34 - 35)
	0.0				
	0.0			END OF BORING - 35'	

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-13
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/28/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	1.0'	0-0.25' CONCRETE	SB-13 (5 - 6) SB-13 (6 - 7)
	0.3			0.25-1' dark brown, fine SAND, organics, trace silt	
	0.8		1-5' NO RECOVERY		
	548.3		5-6' red-brown, clayey fine SAND, with some pebbles, strong petrol odor		
	321.6		6-10' light brown, silty CLAY, plastic to very plastic, strong petrol odor		
	279.2				
	86.0	2.0'			
10	48.5		5.0'	10-11' light brown, medium to coarse SAND, visible staining	SB-13 (10 - 11)
	0.0			11-14.5' grey, silty CLAY, plastic to very plastic, slight petrol odor	SB-13 (13 - 14)
	0.0		14.5-15' sub-rounded PEBBLES with brown fine sand and clay matrix	SB-13 (15 - 18)	
	0.0		15-16' same as above		
	0.0		16-20' red-brown, clayey SAND, plastic		
	0.0		4.0'		
20	0.0		5.0'	20-22' red-brown, fine SAND, non-plastic	SB-13 (21 - 22)
	0.0			22-24' red-brown, clayey very fine to fine SAND, plastic	
	0.0		24-25' red-brown, very fine to fine SAND, non-plastic		
	0.0		25-27' red-brown, clayey SILT with some sand, plastic		
	0.0		5.0'	27-29' red-brown clayey SILT with sand, plastic	SB-13 (28 - 29)
	0.0		29-30' red-brown, very fine to fine SAND, non-plastic		
30			5.0'	30-35' NO RECOVERY	
				END OF BORING - 35'	

Date: 6/3/20
Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



Soil Boring ID: SB-14
Project: 175 Roger Ave
Location: Inwood, NY
Field Personnel: J. Arey
Driller: Clean Globe Envr.

Date: 5/27/20
Drilling Method: Direct Push - Geoprobe
Depth to Water: 5' bgs
Total Sampling Depth: 35' bgs
Soil Sampling Method: Grab

Depth Below Surface (ft)	PID Reading (ppm)	Density/ Moisture	Rec. (ft)	Description	Sample Designation
0	0.0	▼	2.5'	0-0.25' CONCRETE; 0.25-0.5' FILL	SB-14 (6 - 7)
	0.0			0.5-1' sub-rounded PEBBLES with red-brown medium to coarse SAND	
	0.0		1-5' red-brown, fine to medium SAND, non-plastic, dry		
	0.0		5-6' same as above, saturated		
	0.0		6-10' dark grey, clayey very fine SAND, with some silt, staining at 6', slightly plastic to plastic		
	2.2				
	2.0				
	0.9				
	0.3				
10	0.0		5.0'	10-11' dark grey, fine SAND, non-plastic	SB-14 (11 - 12) SB-14 (12 - 13)
	0.0			11-11.5' sub-rounded PEBBLES with medium to coarse sand matrix	
	0.0			11.5-13' dark grey, clayey SAND, with some silt, staining an strong petrol odors, plastic	
	25.7		2.5'	13-15' grey, clayey SILT, trace sand and pebbles, plastic	
	40.5			15-17.5' same as above	
	33.6			17.5-20' red-brown, fine SAND, with some clay, slightly plastic	
	53.0				
	0.5				
20	0.0		3.0'	20-25' same as above	SB-14 (22 - 23)
	0.0			25-25.5' same as above	
	0.0		5.0'	25.5-28.5' red-brown, sandy SILT, with some clay, plastic	
	0.0			28.5-29.5' dark grey, sandy SILT, with some clay, plastic	
	0.0			29.5-30' red-brown, fine to medium SAND, non-plastic	
		5.0'	30-35' dark grey, fine SAND, non-plastic	SB-14 (29 - 30)	
30	0.0		5.0'		SB-14 (34 - 35)
	0.0				
	2.0				
	1.8			END OF BORING - 35'	

Date: 6/3/20

Drawn by: JA

Fleming-Lee Shue, Inc.
 158 West 29th St. 9Fl.
 New York, New York 10001



APPENDIX D – EXCAVATION WORK PLAN (EWP)

D-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site’s cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table D-1 includes contact information for the above notification. 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 of this SMP.

Table D-1: Notifications*

John Sheehan, NYSDEC DER Project Manager	(631) 444-0244 John.sheehan@dec.ny.gov
Chris Engelhardt, NYSDEC DER Project Manager’s Supervisor	(631) 444-0231 chris.engelhardt@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control	(518) 402-9569 Kelly.lewandowski@dec.ny.gov

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

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of

concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;

- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 Code of Federal Regulation (CFR) 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix F of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results. A NYSDEC Request to Import/Reuse Fill or Soil form is included in Appendix L.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP.

D-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. 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 will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used

as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections D-6 and D-7 of this Appendix.

D-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

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

D-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 New York Codes, Rules and Regulations (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 will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

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

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

D-5 MATERIALS TRANSPORT OFF-SITE

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

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

Truck transport routes will be provided at the time of work. There is no planned excavation work following the remedy and it is premature to provide a truck route map at this time. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; (g) community input where necessary.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

D-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill,

petroleum treatment facility, C&D debris recovery facility) Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

D-7 MATERIALS REUSE ON-SITE

The qualified environmental professional as defined in 6 NYCRR part 375 will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances October 2020 or date of current version, whichever is later guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections X-2 and X-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e) 4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

D-8 FLUIDS MANAGEMENT

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

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a State Pollutant Discharge Elimination System (SPDES) permit.

D-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the RAWP and Decision Document.

The existing cover system is comprised of a minimum of 24 inches of clean soil, asphalt pavement, concrete covered sidewalks and concrete building, etc. The demarcation layer, consisting of orange snow fencing material, white geotextile or equivalent material, etc. will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

D-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at <http://www.dec.ny.gov/regulations/67386.html>, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix D of this SMP.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for **Restricted Residential** site use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 375-6.8(b) in 6 NYCRR Part 375. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for

the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

D-11 STORMWATER POLLUTION PREVENTION

For construction projects exceeding 1 acre, a Stormwater Pollution Prevention Plan (SWPPP) that conforms to the requirements of the NYSDEC Division of Water guidelines and NYS regulations will be prepared and included as an Appendix to this EWP. For other construction project less than 1 acre, the following stormwater pollution prevention measures will be implemented, as appropriate.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible,

they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

D-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

D-13 COMMUNITY AIR MONITORING PLAN

A figure showing the location of air sampling stations based on generally prevailing wind conditions will be provided at the time of work. No work is planned following the remedy and it is premature to provide this information at this time. These locations will be

adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers. A CAMP is included in Appendix E.

D-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will be decided at the time based on site-specific conditions. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

D-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Appendix E. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

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

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

D-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX E
COMMUNITY AIR MONITORING PLAN (CAMP)

**175 Roger Avenue Commercial Development
Brownfield Cleanup Program
Site No. C130164**

**Section 40; Block L; Lots 5, 55, 56, 59, 117, 2579, 2585
Inwood, Nassau County, New York**

**COMMUNITY AIR MONITORING
PROGRAM**

Prepared For

AJM Capital, LLC
New York, New York 10111

Submitted to

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region One
Stony Brook University
50 Circle Road
Stony Brook, NY 11790-3409

by

Fleming Engineering

April 2021

Community Air Monitoring Plan (CAMP)

Purpose

The purpose of the CAMP is to protect downwind receptors (e.g., residences, businesses, schools, nearby workers, and the public) from potential airborne contaminants released as a result of the Site investigation. The CAMP protects receptors by recording real-time particulate (dust) and Volatile Organic Compound (VOC) measurements to prevent the spread of airborne while work is in progress. The particulate and VOC action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown should they be exceeded.

The CAMP does not establish action levels for worker respiratory protection, which are given in the Health and Safety Plan and developed in accordance with 40 CFR 1910 and 1920.

Contaminant Source

The main contaminants of concern in soils are petroleum-related VOCs, benzene, ethylbenzene, toluene, xylene (BTEX); and chlorinated volatile organics (CVOs). Metals represent a secondary and minor concern in Site dry wells.

Remediation Activities

Groundwater is approximately 4 to 6 feet below grade and will be exposed during Site remediation activities. It is not expected to have any material impact on air quality.

The one task with potential to disperse particulates or VOCs into the air is soil excavation; however, this work is largely with moist soil and is expected to materially affect air quality. Regardless, a CAMP will be implemented to ensure that potential impacts are monitored and potential receptors protected.

Receptor Population

Potentially exposed receptors during remediation include workers on Site, individuals living and working in the vicinity of the project and, to a lesser degree, passersby.

Monitoring Plan

Real-time CAMP monitoring will be conducted continuously while conducting remedial excavations, removing soil, and placing backfill. Each CAMP station will measure VOCs and particulates on a continuous basis. One CAMP station will be at the downwind perimeter of the immediate work area and a second CAMP station will be located at the fence line near the residence closest to the work area. A photoionization detector (PID)

will also be on hand to make roving VOC measurements as needed. CAMP monitoring will be in place during all Site intrusive activities including concrete and asphalt removal.

Periodic Monitoring

Periodic VOC monitoring with a PID will occur during. Periodic monitoring during excavation will consist of taking a reading upon excavating a new area, periodically while excavating an area, and at operations where there is a reasonable potential for producing material levels of VOCs.

VOC Monitoring, Response Levels, and Actions

VOCs will be continually monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) using a CAMP station and a second CAMP station near the residence closest to the work area. Upwind concentrations will be measured at the start of each workday using the CAMP station. The PID in the CAMP station will be calibrated at least daily, or more often if needed. The CAMP station will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below and prior background conditions.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work may resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work may resume, provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less (but in no case less than 20 feet) is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, work must cease. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulates will be continually monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) using a CAMP station and a second CAMP station near the residence closest to the work area. Upwind concentrations will be measured at the start of each workday using the CAMP station.

The particulate monitoring will be capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level and prior background levels. The equipment will be fitted with an audible alarm to indicate measurements above the action level. In addition, fugitive dust migration will be visually assessed during all work.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \mu\text{g}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \mu\text{g}/\text{m}^3$ above the upwind level, work will cease and a re-evaluation of activities initiated. Work may resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \mu\text{g}/\text{m}^3$ of the upwind level and in preventing visible dust migration. All readings must be recorded and be available for State (DEC and DOH) personnel to review.

APPENDIX F
HEALTH & SAFETY PLAN

**175 Roger Avenue Commercial Development
Brownfield Cleanup Program
Site No. C130164**

**Section 40; Block L; Lots 5, 55, 56, 59, 117, 2579, 2585
Inwood, Nassau County, New York**

**ENVIRONMENTAL
HEALTH AND SAFETY PLAN**

Prepared For
AJM Capital, LLC
New York, New York 10111

Submitted to

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region One
Stony Brook University
50 Circle Road
Stony Brook, NY 11790-3409

Fleming Engineering

SEPTEMBER 2020

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Site History	2
1.2	Previous Site Investigations.....	2
1.3	Summary of Site Conditions.....	3
2.0	TASKS TO BE PERFORMED UNDER THIS PLAN.....	5
3.0	POTENTIAL CHEMICAL, PHYSICAL, AND BIOLOGICAL HAZARDS AND CONTROLS.....	5
3.1	Potential Chemical Hazards/Controls.....	5
3.2	Physical Hazards/Controls	6
3.3	Biological Hazards/Controls.....	7
3.4	Levels of Personal Protection	7
3.4.1	<i>Level D</i>	<i>8</i>
3.4.2	<i>Modified Level D</i>	<i>8</i>
3.4.3	<i>Level C</i>	<i>9</i>
3.5	General Hazard Controls	9
3.5.1	<i>General Workplace Safety Rules</i>	<i>9</i>
3.5.2	<i>Housekeeping</i>	<i>10</i>
3.5.3	<i>Fire Prevention.....</i>	<i>10</i>
3.5.4	<i>Industrial Hygiene and Occupational Health.....</i>	<i>11</i>
3.5.5	<i>Personal Hygiene.....</i>	<i>11</i>
4.0	TRAINING, PROJECT ORGANIZATION, AND PERSONNEL.....	12
4.1	Training	12
4.2	Project Team Organization.....	12
4.3	Subcontractor Compliance.....	14
5.0	INDIVIDUAL HEALTH AND SAFETY PROGRAMS LISTING	15
5.1	Hazard Communication Program.....	15
5.2	Respiratory Protection Program.....	15
5.3	Occupational Noise Exposure/Hearing Conservation Program.....	15

5.4	Emergency Response Plan.....	15
5.5	Asbestos Control Program	15
5.6	Lead Exposure Program	16
6.1	Site/Work Area Organization	17
6.2	Personnel Decontamination.....	17
6.3	Equipment Decontamination	17
7.0	EMERGENCY AND CONTINGENCY PLAN.....	18

FIGURES

Figure 1	Site Location Map
Figure 2	Site Plan and Proposed Sampling Locations
Figure 3	Hospital Route

TABLES

Table 1	Emergency Contacts and Phone Numbers
Table 2	Project Team Organization

APPENDICES

Appendix A	Acknowledgment Form
Appendix B	Profiles of Chemicals of Concern/Material Safety Data Sheets
Appendix C	Heat Stress/Cold Stress and Related Illnesses
Appendix D	Accident and Injury Report Form

1.0 INTRODUCTION

Fleming Engineering (FE) prepared this Health and Safety Plan (HASP) on behalf of AJM Capital, LLC, for use by FE employees during environmental investigation activities at the 175 Roger Avenue Site (hereafter referred to as the “Site”), Inwood, Nassau County NY.

The Site is located at 175 Roger Avenue, Inwood, Town of Hempstead, Nassau County, New York. It consists of Tax Block L, Lots 5, 55, 56, 57, 59, 117, 2579, and 2585 and is bounded by Roger Avenue to the north, Gates Avenue to the east, residential buildings to the south and a freight service to the west. The Site was developed with a 155,000 square foot, one-story, warehouse building and a 2-story warehouse and office, which were constructed in several stages from 1954 to approximately 1967. The Site operated as a “Sheet Metal Fabrication” factory beginning circa 1961. Rockaway Metal Products occupied the Site from approximately 1971 to 1987, when they abandoned the Site and reportedly left hazardous waste material improperly stored and disposed of on-Site. The primary contaminants of concern at the Site include petroleum hydrocarbons, chlorinated volatile organic compound (VOCs), semi-volatile organic compounds (SVOCs) and metals. The impacted media include soil, soil vapor and groundwater.

The purpose of this HASP is to identify the real and potential hazards associated with the planned environmental field activities and to stipulate appropriate health and safety procedures, particularly where hazardous materials are potentially present. The procedures and guidelines contained in this document are intended to minimize exposure to chemical, physical and biological hazards that may be present in the soil, groundwater, or air, and to reduce the potential for accidents and injuries.

The procedures described in this document were developed in accordance with the provisions of Occupational Safety and Health Administration (OSHA) rule 29 CFR 1910.120 and FE’ experience with similar projects. All Site workers must review this HASP before entering the Site. The Health and Safety Officer (HSO) or designee will ensure that personnel have reviewed the HASP and will provide an opportunity to ask Health and Safety questions during attendance at a pre-field safety meeting. Field personnel will sign the acknowledgment form (Appendix A) maintained on-Site during the investigation. The recommended Health and Safety guidelines in this document may be modified, if warranted, by additional information obtained prior to, or during Site investigation. The HSO will also maintain copies of pertinent health and safety records for all field personnel.

The Occupational Safety and Health Act (1970) requires:

- Employers shall furnish each employee with a place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm.
- Employers must comply with occupational health and safety standards and rules, regulations and orders pursuant to the Act, that are applicable to company business and operations.

- All employees must comply with occupational health and safety standards and regulations under the Act, which are applicable to their actions and situations.
- Employees are encouraged to contact their immediate superior for information that will help them understand their responsibilities under the Act.

1.1 Site History

The Site was developed with a 155,000 square foot, one-story, warehouse building and a 2-story warehouse and office, which were constructed in several stages from 1954 to approximately 1967. The Site operated as a “Sheet Metal Fabrication” factory since at least 1961. Next, Rockaway Metal Products occupied the Site from approximately 1971 to 1987, when they abandoned the Site and reportedly left hazardous waste material improperly stored and disposed of on-Site.

In June 1992, the United States Environmental Protection Agency (EPA) conducted a site inspection and discovered approximately 240 55-gallon deteriorated and/or leaking drums, a 5,000 -gallon tanker trailer, underground storage tanks (USTs), and observed dry wells containing sludge materials. In order to address the hazardous condition, the EPA conducted an Emergency Removal Action beginning in August 1993. The drums, tanker trailer, one (1) 1,000-gallon heating oil UST, and UST piping was removed. The Site was then used largely as a warehouse by various tenants from 1990 to 2004 including an auto repair shop (Gunter Auto Shop) and Long Island Party Rentals. The site was acquired by Nassau County Department of Real Estate in 1995 due to nonpayment of taxes and has remained vacant since approximately 2004. The warehouse building on Site was damaged in a fire in February 2011 and was subsequently condemned. In October 2018, Nassau County, in concurrence with the NYSDEC began demolition of the buildings on Site, which concluded in March 2019.

1.2 Previous Site Investigations

The following Site investigations have been undertaken on the property:

March 2005, *Phase I Environmental Site Assessment* by ATC Associates Inc.

June 2005, *Site Investigation Report* by ATC Associates Inc.

April 2007, *NYSDEC BCP Remedial Investigation Work Plan* by ATC Associates Inc.

June, 2009 *NYSDEC BCP Remedial Investigation Report* by ATC Associate Inc.

November 2018, *Phase I Environmental Site Assessment* by Fleming-Lee Shue Inc.

August 2020, Supplemental Remedial Investigation (SRI) conducted by Fleming Engineering

These investigations identified the following conditions at the Site.

Historic Operations On-Site— According to the historic Sanborn Maps, city directories, and environmental database review the Site operated as a Sheet Metal Fabrication plant starting in 1961 and Far Rockaway Metal Products from 1971 to 1987. Historic use of the site in these

operations could have impacted the quality of the Site including soil, groundwater, and soil vapor and is therefore considered a Recognized Environmental Concern (REC).

Improper Storage of Hazardous Material On-Site— According to the environmental database review, in 1987 Rockaway Metal Products abandoned the Site and reportedly left hazardous waste materials improperly stored and disposed of on-Site. In June 1992, the United States Environmental Protection Agency (USEPA) conducted a site inspection and discovered 240 55-gallon deteriorated and leaking drums, a 5,000-gallon tanker trailer in poor condition, dry wells that appeared to contain sludge material and USTs that contained potentially flammable liquids. The drums, tanker trailer, and one 1,000-gallon UST located in the southeast portion of the Site was removed. The improper storage of this hazardous waste could have exposed the subsurface to contaminants including petroleum hydrocarbons, chlorinated volatile organic compounds, semi-volatile organic compounds (SVOCs), and metals. These contaminants could have adversely impacted the quality of the Site including soil, groundwater and soil vapor and therefore are considered a REC.

Potential Hazardous Waste On-Site— During Site Reconnaissance, FE observed FE observed garbage and debris was ubiquitous throughout the Site and heavily concentrated along property boundaries indicating the Site was likely used for illegal dumping. FE observed stockpiles of 100+ used tires, broken asphalt, general refuse, debris, and six (6) 55-gallon drums throughout the Site. The contents and integrity of on-Site drums could not be determined as FE could not access the Site during on-going demolition operations. Without closer examination FE cannot rule out contamination from these sources impacting the quality of the Site and therefore they are considered RECs.

Historical Underground Storage Tanks (USTs) On-Site—According to the environmental database review the Site has contained a number USTs on Site, which varies depending on source. Collectively, there appears to have been upwards of seven (7) USTs on Site historically and potentially four (4) currently abandoned on-Site. According to the database review, contents of the tanks reportedly included fuel oil, gasoline, xylene and naphthalene. Site Investigation conducted by ACT Associates Inc. in May 2005 included an electromagnetic ground penetrating radar (EM/GPR) survey that revealed five (5) underground anomalies thought to be USTs. The Site itself is located in an area of shallow groundwater and salt water intrusions induced by tidal fluctuations beneath the Site could potentially accelerate the corrosion of the USTs. The presence of USTs on-Site with a history of leaking could have adversely impacted the quality of the Site including soil, groundwater, and soil vapor and therefore is considered a REC.

1.3 Summary of Site Conditions

The most recent SRI found soils to be minimally impacted. Nearly all soil impacts were from metals (arsenic, cadmium, lead, mercury, chromium, copper, zinc) in the dry wells on the western portion of the property.

Soil vapor impacts were low across the Site and were elevated for Tetrachloroethene (PCE) and Trichloroethene (TCE) in a few location nears the eastern part of the Site.

Groundwater was the most impacted medium and was impacted by PCE, TCE, and xylenes primarily in the UST Area in the northeast corner of the Site, although PCE and TCE appear in groundwater through the Site.

The highest concentration of PCE and TCE occur in the 30 to 35-foot interval in the UST Area where concentrations reached a maximum of 7,610 $\mu\text{g/L}$ of PCE and a maximum of 5,440 $\mu\text{g/L}$ of TCE. Xylene concentrations were greater in shallow depths reaching a maximum concentration of 45,700 $\mu\text{g/L}$ in the 10 to 15-foot interval.

2.0 TASKS TO BE PERFORMED UNDER THIS PLAN

The tasks to be performed under this plan include:

- Soil Excavation
- Concrete pad demolition and removal
- Collection of endpoint soil samples and waste classification samples
- Installation of temporary and permanent monitoring wells
- Loading soils onto trucks
- Installing clean backfill
- Soil vapor monitoring

3.0 POTENTIAL CHEMICAL, PHYSICAL, AND BIOLOGICAL HAZARDS AND CONTROLS

This section discusses the potential chemical, physical, and biological hazards and controls associated with the investigation tasks above. A summary of potential site safety hazards and safety requirements is presented in Table 1.

3.1 Potential Chemical Hazards/Controls

Based on the previous investigations conducted at the site, this HASP focuses on the following potential chemicals of concern:

- VOCs
 - Benzene
 - Toluene
 - Ethylbenzene
 - Xylenes
 - Trichloroethylene
 - Tetrachloroethylene
 - cis 1,2 dichloroethylene
 - Acetone
 - Methyl Ethyl Ketone (MEK)
 - Arsenic
 - Lead
 - Cadmium
 - Chromium
 - Mercury
 - Copper
 - Zinc
- Other
 - Dust from fill and concrete removal

Appendix B lists the recognized and suspected health hazards, exposure limits, physical and chemical properties, recommended protection levels and symptoms of exposure for the chemicals known or suspected to be present at the site. The chemical hazards will be minimized by limiting exposure of personnel to soil and groundwater and by the use of personnel protective equipment (PPE).

3.2 Physical Hazards/Controls

Physical hazards potentially present at the site include, but are not limited to, the following:

Hazard	Control
Slip, trip and fall (uneven terrain and slippery surfaces)	Avoid Uneven Terrain, Walk Slowly, Wear Sturdy/Supportive Shoes
Environmental (heat/cold) stress;	A discussion of heat stress and cold stress and related illnesses and controls is provided in Appendix C.
Vehicular Traffic	Avoid working in high traffic areas. If necessary, use cones, reflective vests, and consider use of a flagman/additional protection.
Fire	Ensure class ABC fire extinguisher is nearby to work area when using equipment that can provide an ignition source (heavy machinery, generators, power tools)
Noise hazards	Use ear plugs and/or ear muffs during demolition and excavation activities.
Use of heavy equipment	Stay clear of heavy equipment during operation. Maintain eye contact with operator when approaching equipment.
Flying Debris	Safety glasses and hard hats will be used during all demolition and excavation activities.
Noise	Hearing protection will be used during all demolition and excavation activities.
Dust	Appropriate face and or dust masks will be used during all demolition and excavation activities.

Anticipated site operations do not include the need for specific operations such as, lockout/tag-out, scaffolds or confined spaces; therefore these items are not addressed in this HASP. If site activities require these operations, the HASP will be amended and properly trained, experienced and competent personnel shall be utilized.

3.3 Biological Hazards/Controls

The work is scheduled to be completed during summer and is located outdoors, however the following hazards may or may not be present at the site.

Hazard	Control
Bites or stings from insects/animals (particularly ticks) resulting in skin inflammation, disease, or allergic response	Keep exposed skin covered. Use insect repellent if necessary. Inspect yourself carefully after work is completed.
Allergens and toxins from plants and animals, producing dermatitis, rhinitis, or asthma	Keep exposed skin covered using proper PPE. Wash hands regularly.
Skin irritation from poison ivy, oak, sumac	Keep exposed skin covered using proper PPE. Wash hands regularly.
COVID-19	Keep exposed skin covered using proper PPE. Wash hands regularly. Social distancing. Wearing mask and gloves.

3.4 Levels of Personal Protection

Personal protective equipment (PPE) must be worn as required for each job in all operations where there is an exposure to hazardous conditions. Upon review of contaminant levels, physical and biological hazards, exposure routes and the nature of the field tasks, it has been determined that the Level D protection will be used during field activities.

In the event that caustic or high pH soils or groundwater are encountered during remediation activities the level of protection may need to be upgraded from Level D to Modified Level D. Modified Level D protection serves as increased dermal protection when there is not an increased in need respiratory protection.

Photoionization detector (PID) readings above 5 ppm require caution. A sustained PID measurement greater than 5 ppm above the background level or objectionable nuisance odors, detected over a 15-minute period in the breathing zone, will require upgrading respiratory protection to Level C.

If a sustained PID measurement reach 30 ppm above the background level or higher in the worker breathing zone, and 5 ppm or higher at the perimeter (20 feet from where the work is being done), it is recommended to stop the work and resume work only after the PID measurements drop below 30 ppm in the worker breathing zone.

Instrument	Action Level	Response Action
PID	< 5 ppm over background level	Level D
	≥ 5 and ≤ 30 pm over background level	Upgrade to Level C, notify HSO immediately, initiate perimeter monitoring
	> 30 ppm over background level in worker breathing zone, or > 5 ppm over background at perimeter	Stop work, resume work after levels drop below 30 ppm in worker breathing zone

Lists of the protection equipment for Levels D and C are summarized below:

3.4.1 Level D

Level D applies to work in areas where the possibility of contact with potentially contaminated groundwater and soil exists. The protective equipment required for Level D includes, but is not limited to, the following:

- Work clothes or coveralls;
- Safety boots, with steel toe;
- Safety glasses;
- Reflective vest;
- Hard hat;
- Disposable latex gloves;
- Hearing protection, to be used as needed; and
- HEPA Dust Mask for Nuisance Dust as needed.

3.4.2 Modified Level D

Modified Level D applies to work in areas where the possibility of contact with potentially contaminated groundwater and soil is probable or certain and a greater level of protective equipment is warranted. The protective equipment required for Level D includes, but is not limited to, the following:

- Protective clothing and other equipment required for Level D;
- Tyvek coverall;
- Rubber Overboots or boot covers;
- Heavy Duty Rubber or Chemical Resistant Gloves; and
- Safety Goggles or Splash Shield.

3.4.3 Level C

Level C protection will include, but is not limited to, the following:

- Protective clothing and other equipment required for Level D;
- Full-face air purifying respirator (APR) with high efficiency particulate/organic vapor cartridges (ultra-twin with GMCH cartridges);
- Saranex-coated disposable coveralls with hoods ;and
- Boot covers.

3.5 General Hazard Controls

3.5.1 General Workplace Safety Rules

- Report unsafe conditions, accidents, injuries, or incidents to the HSO and Project Manager.
- Use eye and/or face protection where there is danger from flying objects or particles, (such as when grinding, chipping, burning and welding, etc.) or from hazardous chemical splashes.
- Dress properly. Loose clothing and jewelry shall not be worn.
- Keep all equipment in safe working condition. Never use defective tools or equipment.
- Report any defective tools or equipment to immediate supervisor. Defective equipment will be taken out of service immediately and repaired or destroyed.
- Properly care for and be responsible for all PPE.
- Do not leave materials in aisles, walkways, stairways, work areas, roadways, or other points of egress.
- Practice good housekeeping at all times.
- Training on equipment is required prior to unsupervised operation.
- During work, pause every few minutes and assess surrounding conditions.
- Crossing highways and major roadways is not recommended. Expect movement of cars and buses at any time along any roadway, regardless of traffic signals, stop signs, yield signs, etc.
- When walking on right-of-way or road-shoulders, keep a sharp lookout in both directions.
- For personal safety, be cognizant of your surroundings and ensure that equipment is properly secured.

- Whenever possible, objects will be lifted and moved by mechanical devices (cranes, manually operated chain hoists, fork trucks, etc.) rather than by manual effort.
- The mechanical devices will be appropriate for the lifting or moving task and will be operated only by trained and authorized personnel.
- Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects.
- Personnel will not pass under a raised load, nor will a suspended load be left unattended.
- Operations near overhead power lines are prohibited unless the power source has been shut off and locked out/tagged out or the appropriate clearance distances are maintained.
- Hand and power tools will be maintained in a safe condition to protect both the worker and the public from injury.
- Follow OSHA's vehicle management requirements, designed to ensure that vehicles are maintained and operated in a safe condition to protect workers and the public.
- A dry chemical fire extinguisher and hose with potable water should be available when excavating and handling soils.

3.5.2 Housekeeping

- Proper housekeeping is the foundation for a safe work environment. It definitely helps prevent accidents and fires, as well as creating a professional appearance in the work area.
- Material will be piled or stored in a stable manner so that it will not be subject to falling.
- Combustible scrap, debris, and garbage shall be removed from the work area at frequent and regular intervals.
- Stairways, walkways, exit doors, in front of electrical panels, or access to fire-fighting equipment will be kept clear of materials, supplies, trash, and debris.

3.5.3 Fire Prevention

- All firefighting equipment shall be conspicuously located, accessible, and inspected periodically, and maintained in operating condition. An annual service check and monthly visual inspections are required for fire extinguisher.
- All employees must know the location of fire-fighting equipment in the work area and have knowledge of its use and application.

3.5.4 Industrial Hygiene and Occupational Health

- Toilet facilities shall be provided as required for the number of workers.
- A first aid kit and portable eyewash station shall be kept on site.
- An adequate supply of potable water shall be provided.
- The use of a common drinking cup is prohibited.
- Employees must be protected against exposure to hazardous noise levels by controlling exposure or by use of proper PPE.
- Any FE Activities will be assessed for lead exposure (particularly if drywall or any painted surfaces or abrasive blasting/grinding is involved) and/or asbestos exposure.

3.5.5 Personal Hygiene

Eating, drinking and the use of tobacco products in the work area are prohibited. The use of alcohol or other non-prescription drugs by personnel that could impair the ability to function at the work site is prohibited. The use of some prescription drugs may impair the ability to function and can create safety problems on-site. Field personnel taking prescription medication should alert the HSO in case of an emergency. Beards or facial hair that could interfere with the use of a respirator are not permitted. Dermal contact with groundwater should be avoided. This includes avoiding walking through puddles, pools, and mud, sitting or leaning on or against drums, equipment, or on the ground. Field personnel should wash their hands before eating, smoking, using the toilet, etc. Field personnel should wash their hands and face and shower (daily) as soon as possible after leaving the site.

4.0 TRAINING, PROJECT ORGANIZATION, AND PERSONNEL

4.1 Training

Knowledge of the safety rules supplemented by compliance is essential to safety. New employees will be provided orientation training and will be furnished information and literature covering the company health and safety policies, rules, and procedures. This orientation training must be provided prior to the employee's visit to the Site.

All employees will have successfully completed the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4]).

Employees must read the HASP and project-specific Work Plan, which contains the applicable regulations/standards for their job.

Prior to beginning work on-Site, and weekly thereafter, the HSO will lead safety-training sessions and/or "tailgate" training meetings. These meetings will be conducted to provide information and training on new equipment, new procedures, new chemicals, refresher/remedial training in specific areas, or meet annual requirements. Such training may be held in conjunction with the safety briefings/meetings addressed elsewhere in this program.

If necessary, the HSO will ensure that employees are scheduled and provided specialized training as required. Examples of specified training include (but are not limited to):

- Safe handling/use of flammables, poisons, or toxics
- Respirator care/use
- Hazard communication (hazardous chemicals)
- Slip, trip and fall hazards and fall protection
- Suppression and Monitoring

Specialized training will be documented in the employees' personnel records and/or in a master training record.

4.2 Project Team Organization

All personnel who participate in field activities will be required to attend a Health and Safety meeting prior to the commencement of field activities. The project team organization is shown on Table 2, and the roles are described below.

Health and Safety Officer (HSO)

- Administers all aspects of the occupational health and safety program
- Develops programs and technical guidance to identify and remove physical, chemical, and biological hazards from facilities, operations, and sites

- Assists management and supervisors in the health and safety training of employees
- Conducts inspections to identify unhealthy or unsafe conditions or work practices
- Investigates all accidents and takes action to eliminate accident causes
- Monitors to determine the degree of hazard
- Determines the protection levels and equipment required to ensure the safety of personnel
- Evaluates on-site conditions (i.e., weather and chemical hazard information) and recommending to the project manager and/or the field coordinator, modifications to the work plan and personnel protection levels
- Monitors performance of all personnel to ensure compliance with the required safety procedures
- Ensures that all personnel have been trained in proper site-safety procedures including the use of PPE, and have read and signed the Acknowledgment Form (Appendix A)
- Conducts daily briefings as necessary
- Halts work if necessary
- Ensures strict adherence to the Site HASP
- Reviews personnel medical monitoring participation

Project Manager

- Familiar with health and safety regulations related to area of responsibility
- Directs and coordinates health and safety activities within area of responsibility
- Ensures arrangements for prompt medical attention in case of serious injury
- Requires all employees supervised to use individual protective equipment and safety devices
- Ensures that safety equipment is available, maintained, used, and stored correctly
- Instructs and trains all persons within area of responsibility in health and safety requirements
- Conducts frequent and regular health and safety inspections of work area. Directs correction of unsafe conditions
- Conducts weekly safety briefings with all supervisors and/or workers
- Requires all subcontractors and subcontractor personnel to comply with health and safety regulations

All Employees

The minimum personal qualifications for each individual participating in field activities include:

- OSHA-specific medicals including, but not limited to, audiometric testing under the hearing conservation program and medical approval for the use of respirators
- Participation in the FE Occupational Health Monitoring Program
- Successful completion of the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4])
- Be familiar with and comply with proper health and safety practices
- Use the required safety devices and proper personal protective safety equipment
- Notify HSO/supervisor immediately of unsafe conditions/acts, accidents, and injuries. In the event of an injury a Accident and Injury Report Form will be filled out (Appendix D).

4.3 Subcontractor Compliance

All FE contracts and subcontracts require that state and federal laws concerning health and safety will be observed by the subcontractor.

5.0 INDIVIDUAL HEALTH AND SAFETY PROGRAMS LISTING

OSHA standards specify various individual programs that may be applicable to work performed on construction sites. Highlights of these programs are provided below, and specific written programs or procedures may be included into this written program, attached, or developed separately.

5.1 Hazard Communication Program

If employees are exposed to or work with hazardous chemicals at the job site, this program is required. Required elements of the written program include a master listing of chemicals; maintaining material safety data sheets on each chemical; and training of employees on the program, the chemicals exposed to, and material safety data sheets.

5.2 Respiratory Protection Program

If employees are exposed to hazardous/toxic chemical, paint or other gases, vapors, fumes, dusts, or mists above the National Institute for Occupational Safety and Health (NIOSH) permissible exposure limit (PEL), and/or employees wear respirators, this program is required. Program elements are written program for the selection, maintenance, care, and use of respirators; fit testing, training, and employee evaluation for use. .

5.3 Occupational Noise Exposure/Hearing Conservation Program

If employees are exposed to noise levels above the permissible noise exposures, protection against the effects of noise and an effective hearing conservation program are required. Such a program would include elements such as a written program, noise monitoring, hearing evaluations and follow-on testing, personal protective equipment (hearing protection), and maintenance of medical records.

5.4 Emergency Response Plan

If employees are engaged in emergency response to a hazardous substance/chemical release, an emergency response plan must be developed and implemented. Program elements include a written response plan, identification and training of responding employees, medical surveillance and consultation, and post response operations.

5.5 Asbestos Control Program

If employees are exposed to asbestos fibers in the workplace, then an initial monitoring for asbestos exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personal protective equipment, and training.

5.6 Lead Exposure Program

If employees are exposed to lead in the workplace, then an initial monitoring for lead exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personal protective equipment, and training.

6.0 DECONTAMINATION

6.1 Site/Work Area Organization

A typical site work area will consist of an exclusion zone where the actual field activity will take place; a decontamination zone; and a command post located outside the decontamination area and exclusion zones.

Levels of personal protection in the exclusion zone will vary depending on air monitoring data, and will be specified by the Site HSO.

6.2 Personnel Decontamination

Decontamination (decon) of personnel consists of physically removing soil or contaminants using the correct procedures for washing and removal of PPE. Decon will take place in the designated decontamination zone using the following steps, if applicable:

- Soap and potable water wash and potable water rinse of gloves
- Tyvek removal
- Glove removal
- Field wash of hands and face

6.3 Equipment Decontamination

The following decontamination procedure will be implemented in the field after field equipment has come in contact with contaminated material.

- Rinse equipment in tap water
- Scrub equipment with non-phosphate detergent and tap water
- Rinse equipment with distilled water
- Allow equipment to air dry

7.0 EMERGENCY AND CONTINGENCY PLAN

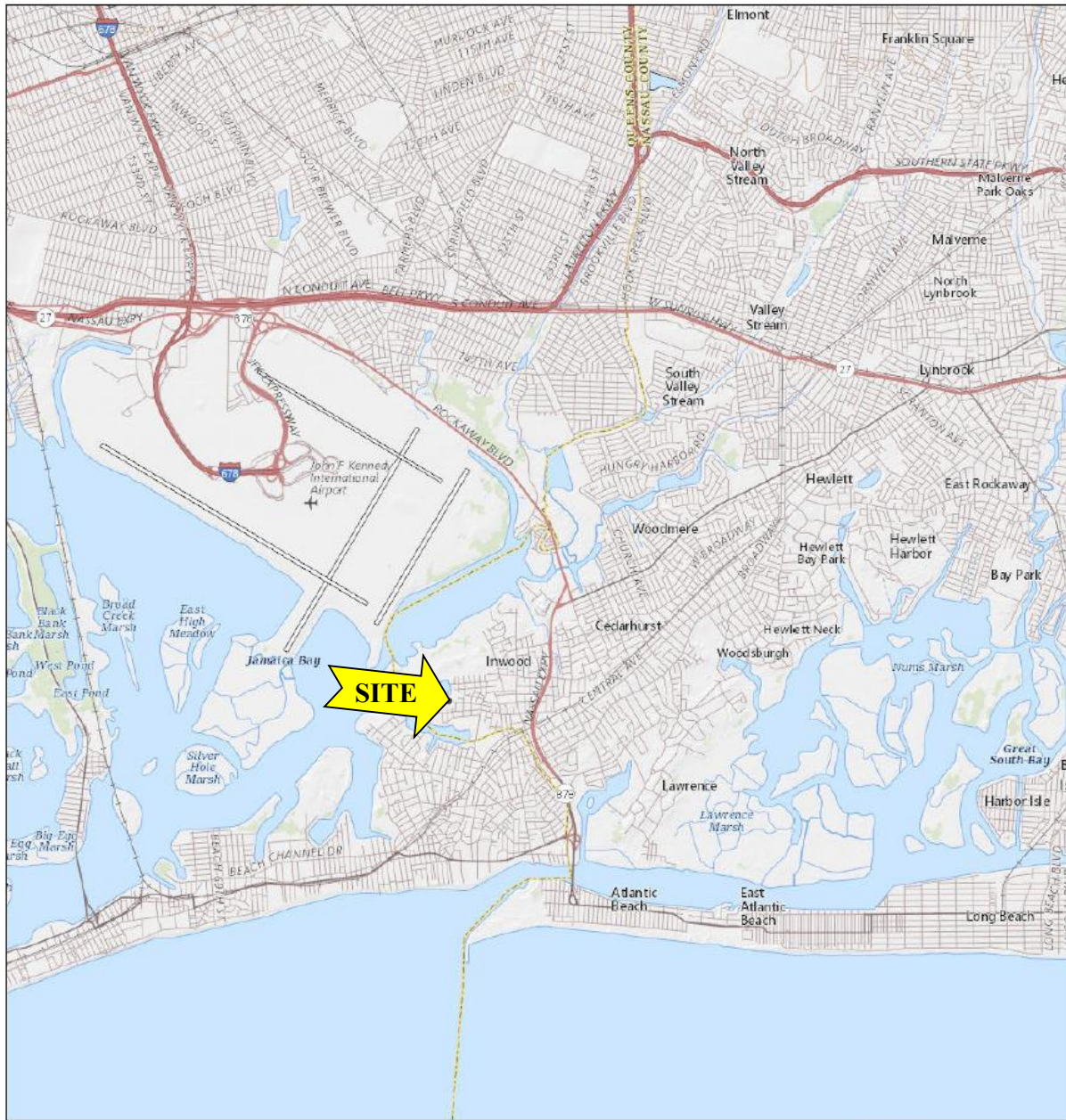
Emergency communications will be maintained during all on-site field activities. The emergency route to the hospital is depicted on Figure 3 and emergency contacts and their phone numbers are presented in Table 2.

A first aid kit will be available on-site at all times for any minor on-site injuries. Emergency medical assistance or ambulance can be reached by calling 911 for more severe injuries.

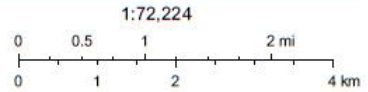
A site specific emergency plan will be developed in the field which will include evacuation procedures, chain of command, rally point, and emergency procedures.

FIGURES





10/25/2018, 4:56:07 PM



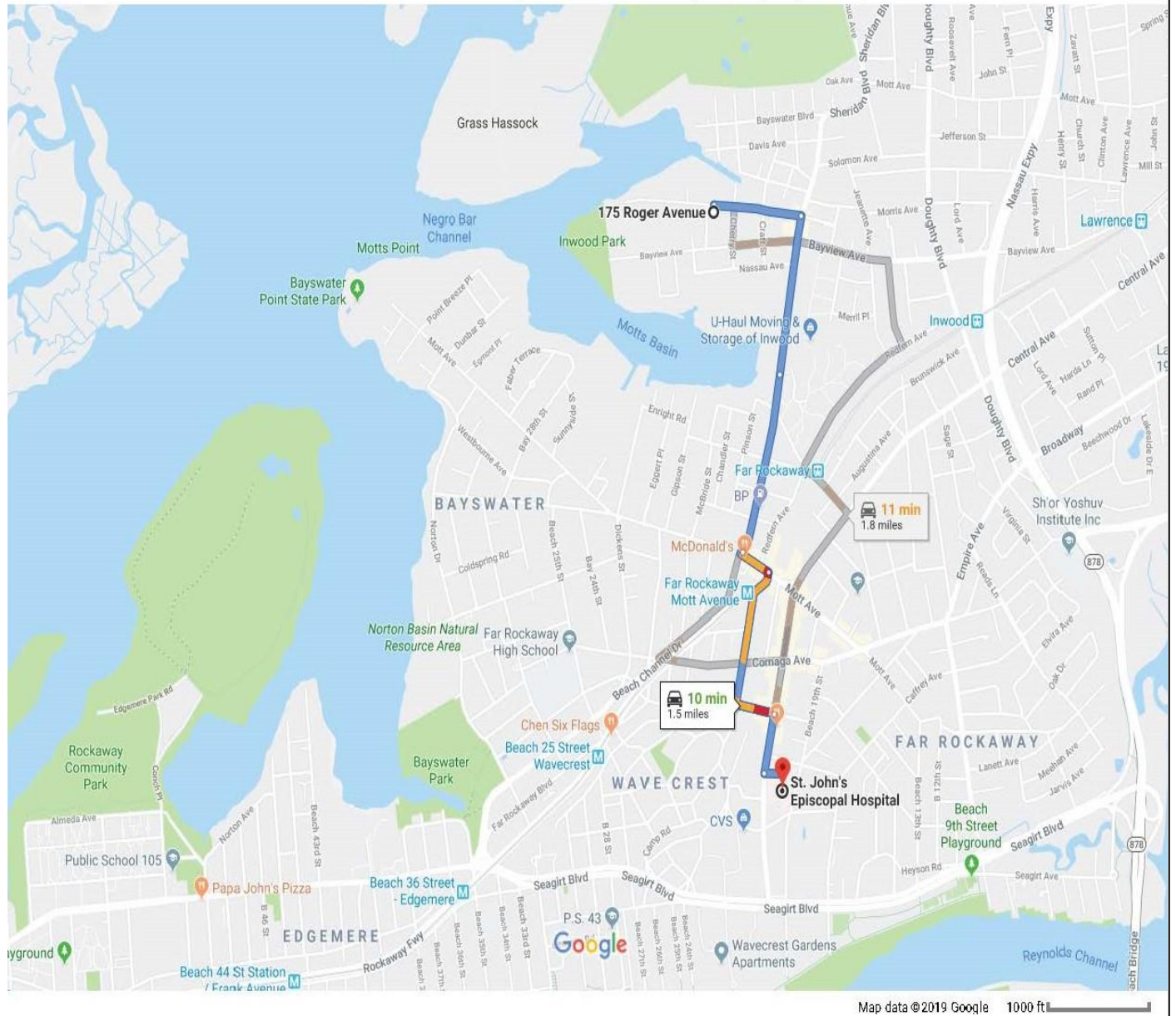
Quadrant 7.5 Minute Topographic Map, published by the USGS, and obtained from National Map Viewer ©2018

FIGURE 1: SITE LOCATION MAP



SITE: 175 Rogers Ave
Inwood, NY, 11096

CLIENT: AJM Capital



Google Maps, published ©2019

FIGURE 3: HOSPITAL ROUTE



SITE: 175 Roger Avenue
Inwood, Nassau County, NY

CLIENT: AJM Capital, LLC.

Environmental Management & Consulting, 158 West 29th Street, 9th Fl., New York, NY 10001

TABLES

HEALTH AND SAFETY PLAN

175 Roger Avenue
Inwood, Nassau County NY.

Emergency Contacts and Phone Numbers

Company	Title	Contact Number
Fleming-Lee Shue, Inc 158 West 29 th Street New York, NY 10001		(212) 675-3225
Arnold Fleming	Project Director	(917) 885-1475 (cell)
Mark Hutson	Senior Project Manager	(480) 907-8207 (cell)
Steve Panter	Quality Assurance Manager	(609) 751-1395 (cell)
Joel Kane	Health and Safety Officer	(406) 321-0586 (cell)

EMERGENCY

911

HOSPITAL

St. John's Episcopal Hospital:
327 Beach 19th St.
Far Rockaway, NY 11691

(718) 869-7000
(main and emergency line)

EMERGENCY SPILL RESPONSE:

New York State Department of Environmental
Conservation (NYSDEC)
NYSDEC Hotline
Oil or Abandoned Chemicals
Releases from Underground Petroleum Storage Tanks
Hazardous Waste

1-800-457-7362

HEALTH AND SAFETY PLAN

175 Roger Avenue
Inwood, Nassau County, NY

Project Team Organization

Personnel	Responsibilities
Arnold Fleming, P.E.	President, FLS Project Director
Mark Hutson	Senior Project Manager
Steve Panter	Senior Project Manager Quality Assurance Manager
Joel Kane	Task Manager Health and Safety Officer
Jordan Arey	Alternative Health and Safety Officer

APPENDIX A

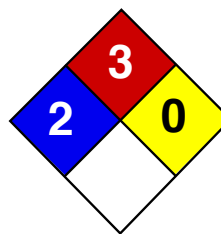
Acknowledgement Form



APPENDIX B

Profiles of Chemicals of Concern Safety Data Sheets





Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C₆-H₆

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Vigorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:

Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m³) from ACGIH (TLV) [United States]
TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m³) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m³) [Canada] TWA: 0.5 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:

Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:

Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia) Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R62- Possible risk of impaired fertility. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

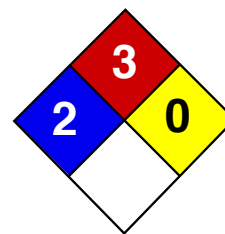
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C₆H₅-CH₃ or C₇H₈

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m³) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 2.7$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

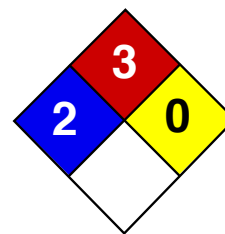
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C₈H₁₀

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:

CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m³) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 3.1$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:

Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm, it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and consciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastrointestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information**References:**

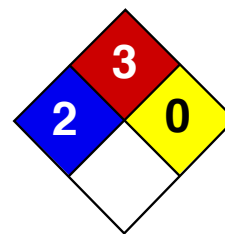
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

Created: 10/09/2005 05:28 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C₆H₄(CH₃)₂

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:

Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 100 (ppm) [Canada] TWA: 435 (mg/m³) [Canada] TWA: 434 STEL: 651 (mg/m³) from ACGIH (TLV) [United States]
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 3.1$

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:

Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and female fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may also cause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Xylenes Illinois chemical safety act: Xylenes New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes Pennsylvania RTK: Xylenes Minnesota: Xylenes Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes California Director's List of Hazardous Substances: Xylenes TSCA 8(b) inventory: Xylenes SARA 302/304/311/312 hazardous chemicals: Xylenes SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R10- Flammable. R21- Harmful in contact with skin. R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

HMS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

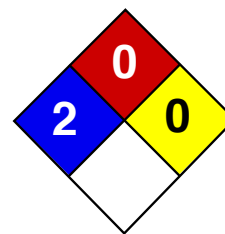
References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:54 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolvel; Tetrachloroethene; Tetraleno; Tetralex; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C₂-Cl₄

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:

Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m³) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium, barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symptoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorientation, seizures, emotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver (hepatitis, fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/central nervous system/peripheral nervous system (impaired memory, numbness of extremities, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fathead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene: Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

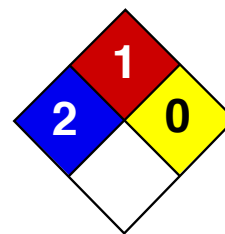
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMS (U.S.A.):**Health Hazard:** 2**Fire Hazard:** 0**Reactivity:** 0**Personal Protection:** g**National Fire Protection Association (U.S.A.):****Health:** 2**Flammability:** 0**Reactivity:** 0**Specific hazard:****Protective Equipment:**

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information**References:** Not available.**Other Special Considerations:** Not available.**Created:** 10/10/2005 08:29 PM**Last Updated:** 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	1
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C₂HCl₃

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse].
DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH.

MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not

available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO₂), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m³) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:

Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:

Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

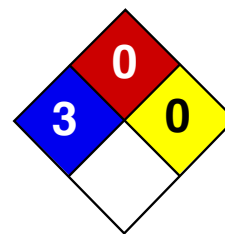
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:54 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	3
Fire	0
Reactivity	0
Personal Protection	J

Material Safety Data Sheet

Trichloroacetic acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroacetic acid

Catalog Codes: SLT2056, SLT3349

CAS#: 76-03-9

RTECS: AJ7875000

TSCA: TSCA 8(b) inventory: Trichloroacetic acid

CI#: Not applicable.

Synonym: Aceto-caustin; Trichloroacetate;
Trichloroethanoic acid; Trichloromethanecarboxylic acid;
Acetic acid, trichloro-

Chemical Name: Trichloroacetic Acid

Chemical Formula: CCl₃COOH

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroacetic acid	76-03-9	100

Toxicological Data on Ingredients: Trichloroacetic acid LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive), of eye contact (corrosive). Slightly hazardous in case of skin contact (permeator). The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to

lungs. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Non combustible.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:

Corrosive solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 1 (ppm) from ACGIH (TLV) [United States] TWA: 1 from NIOSH [United States] TWA: 7 (mg/m³) from NIOSH [United States] TWA: 7 (mg/m³) from OSHA (PEL) [United States] TWA: 1 (ppm) from OSHA (PEL) [United States] TWA: 1 (ppm) [Canada] TWA: 6.7 (mg/m³) [Canada] TWA: 1 (ppm) [United Kingdom (UK)] TWA: 1 (ppm) [France] TWA: 5 (mg/m³) [United Kingdom (UK)] TWA: 5 (mg/m³) [France] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystals solid. Deliquescent crystals solid.)

Odor: Characteristic. Pungent.

Taste: Not available.

Molecular Weight: 163.39 g/mole

Color: White.

pH (1% soln/water): Acidic.

Boiling Point: 195.5°C (383.9°F)

Melting Point: 57.5°C (135.5°F)

Critical Temperature: Not available.

Specific Gravity: Density: 1.6126 @ 64 deg. C(Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 1.3

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Easily soluble in cold water, hot water, diethyl ether, acetone. Solubility in water @ 25 deg. C: 1000 g/100 ml water. Solubility in water @ 25 deg. C: 1306 g/100 g water. Solubility in methanol @ 25 deg. C: 2143 g/ 100 g water. Solubility in ethyl ether @ 25 deg. C: 617 g/100 g water. Solubility in acetone @ 25 deg. C: 850 g/100 g water. Solubility in benzene @ 25 deg. C: 201 g/100 g water. Solubility in o-Xylene @ 25 deg. C: 201 g/100 100 water. It is soluble in ethanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture

Incompatibility with various substances: Reactive with oxidizing agents, metals.

Corrosivity:

Highly corrosive in presence of aluminum, of zinc. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Incompatible with iron, zinc, aluminum.

Special Remarks on Corrosivity: Corrosive to iron, zinc, aluminum

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: lungs.

Other Toxic Effects on Humans:

Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (irritant), of ingestion, . Hazardous in case of skin contact (corrosive), of eye contact (corrosive). Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects and birth defects(teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Trichloroacetic acid UNNA: 1839 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Trichloroacetic acid Illinois toxic substances disclosure to employee act: Trichloroacetic acid Rhode Island RTK hazardous substances: Trichloroacetic acid Pennsylvania RTK: Trichloroacetic acid Massachusetts RTK: Trichloroacetic acid Massachusetts spill list: Trichloroacetic acid New Jersey: Trichloroacetic acid TSCA 8(b) inventory: Trichloroacetic acid

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):

R35- Causes severe burns. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

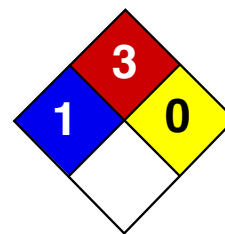
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:30 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Acetone MSDS

Section 1: Chemical Product and Company Identification

Product Name: Acetone

Catalog Codes: SLA3502, SLA1645, SLA3151, SLA3808

CAS#: 67-64-1

RTECS: AL3150000

TSCA: TSCA 8(b) inventory: Acetone

CI#: Not applicable.

Synonym: 2-propanone; Dimethyl Ketone;
Dimethylformaldehyde; Pyroacetic Acid

Chemical Name: Acetone

Chemical Formula: C₃H₆O

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Acetone	67-64-1	100

Toxicological Data on Ingredients: Acetone: ORAL (LD50): Acute: 5800 mg/kg [Rat]. 3000 mg/kg [Mouse]. 5340 mg/kg [Rabbit]. VAPOR (LC50): Acute: 50100 mg/m 8 hours [Rat]. 44000 mg/m 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. The substance is toxic to central nervous system (CNS). The substance may be toxic to kidneys, the reproductive system, liver, skin. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 465°C (869°F)

Flash Points: CLOSED CUP: -20°C (-4°F). OPEN CUP: -9°C (15.8°F) (Cleveland).

Flammable Limits: LOWER: 2.6% UPPER: 12.8%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Vapor may travel considerable distance to source of ignition and flash back.

Special Remarks on Explosion Hazards:

Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid + sulfuric acid, chromic anhydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol + hydrogen peroxide, potassium ter-butoxide, sulfur dichloride, 1-methyl-1,3-butadiene, bromoform, carbon, air, chloroform, thitriazylperchlorate.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, acids, alkalis.

Storage:

Store in a segregated and approved area (flammables area) . Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Keep away from direct sunlight and heat and avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 500 STEL: 750 (ppm) from ACGIH (TLV) [United States] TWA: 750 STEL: 1000 (ppm) from OSHA (PEL) [United States] TWA: 500 STEL: 1000 [Australia] TWA: 1185 STEL: 2375 (mg/m3) [Australia] TWA: 750 STEL: 1500 (ppm) [United Kingdom (UK)] TWA: 1810 STEL: 3620 (mg/m3) [United Kingdom (UK)] TWA: 1800 STEL: 2400 from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Fruity. Mint-like. Fragrant. Ethereal

Taste: Pungent, Sweetish

Molecular Weight: 58.08 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 56.2°C (133.2°F)

Melting Point: -95.35 (-139.6°F)

Critical Temperature: 235°C (455°F)

Specific Gravity: 0.79 (Water = 1)

Vapor Pressure: 24 kPa (@ 20°C)

Vapor Density: 2 (Air = 1)

Volatility: Not available.

Odor Threshold: 62 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; $\log(\text{oil/water}) = -0.2$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, exposure to moisture, air, or water, incompatible materials.

Incompatibility with various substances: Reactive with oxidizing agents, reducing agents, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 3000 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 44000 mg/m³ 4 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. Causes damage to the following organs: central nervous system (CNS). May cause damage to the following organs: kidneys, the reproductive system, liver, skin.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenicity) based on studies with yeast (*S. cerevisiae*), bacteria, and hamster fibroblast cells. May cause reproductive effects (fertility) based upon animal studies. May contain trace amounts of benzene and formaldehyde which may cause cancer and birth defects. Human: passes the placental barrier.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. May be harmful if absorbed through the skin. Eyes: Causes eye irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Inhalation: Inhalation at high concentrations affects the sense organs, brain and causes respiratory tract irritation. It also may affect the Central Nervous System (behavior) characterized by dizziness, drowsiness, confusion, headache, muscle weakness, and possibly motor incoordination, speech abnormalities, narcotic effects and coma. Inhalation may also affect the gastrointestinal tract (nausea, vomiting). Ingestion: May cause irritation of the digestive (gastrointestinal) tract (nausea, vomiting). It may also

affect the Central Nervous System (behavior), characterized by depression, fatigue, excitement, stupor, coma, headache, altered sleep time, ataxia, tremors as well as the blood, liver, and urinary system (kidney, bladder, ureter) and endocrine system. May also have musculoskeletal effects. Chronic Potential Health Effects: Skin: May cause dermatitis. Eyes: Eye irritation.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 5540 mg/l 96 hours [Trout]. 8300 mg/l 96 hours [Bluegill]. 7500 mg/l 96 hours [Fathead Minnow]. 0.1 ppm any hours [Water flea].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Acetone UNNA: 1090 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Benzene California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Benzene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene, Formaldehyde Connecticut hazardous material survey.: Acetone Illinois toxic substances disclosure to employee act: Acetone Illinois chemical safety act: Acetone New York release reporting list: Acetone Rhode Island RTK hazardous substances: Acetone Pennsylvania RTK: Acetone Florida: Acetone Minnesota: Acetone Massachusetts RTK: Acetone Massachusetts spill list: Acetone New Jersey: Acetone New Jersey spill list: Acetone Louisiana spill reporting: Acetone California List of Hazardous Substances (8 CCR 339): Acetone TSCA 8(b) inventory: Acetone TSCA 4(a) final test rules: Acetone TSCA 8(a) IUR: Acetone

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable. R36- Irritating to eyes. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information**References:**

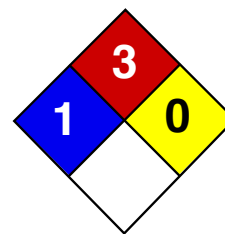
-Material safety data sheet issued by: la Commission de la Sant  et de la S curit  du Travail du Qu bec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. LOLI, RTECS, HSDB databases. Other MSDSs

Other Special Considerations: Not available.

Created: 10/10/2005 08:13 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Methyl ethyl ketone MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl ethyl ketone

Catalog Codes: SLM2626, SLM3232

CAS#: 78-93-3

RTECS: EL6475000

TSCA: TSCA 8(b) inventory: Methyl ethyl ketone

CI#: Not applicable.

Synonym: 2-Butanone

Chemical Name: Methyl Ethyl Ketone

Chemical Formula: C₄H₈O

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl ethyl ketone	78-93-3	100

Toxicological Data on Ingredients: Methyl ethyl ketone: ORAL (LD50): Acute: 2737 mg/kg [Rat]. 4050 mg/kg [Mouse]. DERMAL (LD50): Acute: 6480 mg/kg [Rabbit]. VAPOR (LC50): Acute: 23500 mg/m 8 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation (lung irritant).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to gastrointestinal tract, upper respiratory tract, skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 404°C (759.2°F)

Flash Points: CLOSED CUP: -9°C (15.8°F). OPEN CUP: -5.5556°C (22°F) (Tag).

Flammable Limits: LOWER: 1.8% UPPER: 10%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Ignition on contact with potassium t-butoxide. Vapor may cause a flash fire

Special Remarks on Explosion Hazards:

Reaction with Hydrogen Peroxide + nitric acid forms heat and shock-sensitive explosive product. Mixture with 2-propanol will produce explosive peroxides during storage.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 STEL: 300 (ppm) from ACGIH (TLV) [United States] [1999] TWA: 150 STEL: 300 (ppm) [Australia] TWA: 590 STEL: 885 (mg/m3) from NIOSH TWA: 200 STEL: 300 (ppm) from NIOSH TWA: 590 STEL: 885 (mg/m3) [Canada] TWA: 200 STEL: 300 (ppm) from OSHA (PEL) [United States] TWA: 590 STEL: 885 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:

Acetone-like Pleasant. Pungent. Sweetish. (Strong.)

Taste: Not available.

Molecular Weight: 72.12g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 79.6 (175.3°F)

Melting Point: -86°C (-122.8°F)

Critical Temperature: 262.5°C (504.5°F)

Specific Gravity: 0.805(Water = 1)

Vapor Pressure: 10.3 kPa (@ 20°C)

Vapor Density: 2.41 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.25 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 0.3$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility: Soluble in cold water, diethyl ether, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, mechanical shock, incompatible materials.

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with chloroform, copper, hydrogen peroxide, nitric acid, potassium t-butoxide, 2-propanol, chlorosulfonic acid, strong oxidizers, amines, ammonia, inorganic acids, isocyanates, caustics, pyridines. Vigorous reaction with chloroform +alkali.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2737 mg/kg [Rat]. Acute dermal toxicity (LD50): 6480 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 32000 mg/m³ 4 hours [Mouse].

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. May cause damage to the following organs: gastrointestinal tract, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation (lung irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause birth defects based on animal data. Embryotoxic and/or foetotoxic in animal.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation. May be absorbed through the skin. Eyes: Causes eye irritation. Inhalation: Inhalation of high concentrations may cause central nervous effects characterized by headache, dizziness, unconsciousness, and coma. Causes respiratory tract irritation and affects the sense organs. May affect the liver and urinary system. Ingestion: Causes gastrointestinal tract irritation with nausea, vomiting and diarrhea. May affect the liver. Chronic Potential Health Effects: Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 3220 mg/l 96 hours [Fathead Minnow]. 1690 mg/l 96 hours [Bluegill].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethyl methyl ketone UNNA: 1193 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

New York release reporting list: Methyl ethyl ketone Rhode Island RTK hazardous substances: Methyl ethyl ketone Pennsylvania RTK: Methyl ethyl ketone Minnesota: Methyl ethyl ketone Massachusetts RTK: Methyl ethyl ketone New Jersey: Methyl ethyl ketone California Director's list of Hazardous Substances: Methyl ethyl ketone TSCA 8(b) inventory: Methyl ethyl ketone TSCA 8(d) H and S data reporting: Methyl ethyl ketone: Effective: 10/4/82; Sunset: 10/4/92 SARA 313 toxic chemical notification and release reporting: Methyl ethyl ketone CERCLA: Hazardous substances.: Methyl ethyl ketone: 5000 lbs. (2268 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R36/37- Irritating to eyes and respiratory system. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S33- Take precautionary measures against static discharges.

HMS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:39 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

SAFETY DATA SHEET

Creation Date 22-Sep-2009

Revision Date 23-Jan-2018

Revision Number 3

1. Identification

Product Name cis-1,2-Dichloroethylene

Cat No. : AC113380000; AC113380025; AC113380100; AC113380500

Synonyms cis-Acetylene dichloride.

Recommended Use Laboratory chemicals.

Uses advised against Not for 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 liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word

Danger

Hazard Statements

Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled
Causes serious eye irritation
Causes skin irritation
May cause respiratory irritation

**Precautionary Statements****Prevention**

Wear protective gloves/protective clothing/eye protection/face protection
 Use only outdoors or in a well-ventilated area
 Avoid breathing dust/fume/gas/mist/vapors/spray
 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
 Keep container tightly closed
 Ground/bond container and receiving equipment
 Take precautionary measures against static discharge
 Do not eat, drink or smoke when using this product

Response

Call a POISON CENTER or doctor/physician if you feel unwell

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
 Call a POISON CENTER or doctor/physician if you feel unwell

Skin

IF ON SKIN: Wash with plenty of soap and water
 Take off contaminated clothing and wash before reuse
 If skin irritation occurs: Get medical advice/attention

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

Ingestion

Rinse mouth
 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell

Fire

Explosion risk in case of fire
 Fight fire with normal precautions from a reasonable distance
 Evacuate area

Storage

Store in a well-ventilated place. Keep cool
 Store in a closed container
 Store locked up

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
cis-1,2-Dichloroethylene	156-59-2	97

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 plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation	Move to fresh air. Obtain medical attention. If not breathing, give artificial respiration.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms and effects	Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO ₂). Dry chemical. Use water spray to cool unopened containers. Chemical foam. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	No information available
Flash Point	6 °C / 42.8 °F
Method -	No information available
Autoignition Temperature	440 °C / 824 °F
Explosion Limits	
Upper	12.80%
Lower	9.70%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products

Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide (CO₂)

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 2	Flammability 3	Instability 0	Physical hazards N/A
--------------------	--------------------------	-------------------------	--------------------------------

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.
Environmental Precautions	See Section 12 for additional ecological information. Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment. Use explosion-proof equipment. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.
-----------------	--

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area. Keep container tightly closed in a dry and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
cis-1,2-Dichloroethylene	TWA: 200 ppm			

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

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	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	60 °C / 140 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	201 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Specific Gravity	1.280
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.
Incompatible Materials	Bases
Hazardous Decomposition Products	Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide (CO ₂)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Irritating to eyes, respiratory system and skin
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
cis-1,2-Dichloroethylene	156-59-2	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	Respiratory system
STOT - repeated exposure	None known
Aspiration hazard	No information available
Symptoms / effects, both acute and delayed	Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Endocrine Disruptor Information	No information available
Other Adverse Effects	The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. Do not flush into surface water or sanitary sewer system. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea

cis-1,2-Dichloroethylene	Not listed	Not listed	EC50 = 721 mg/L 5 min EC50 = 905 mg/L 30 min	Not listed
--------------------------	------------	------------	---	------------

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

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 UN1150
 Proper Shipping Name 1,2-DICHLOROETHYLENE
 Hazard Class 3
 Packing Group II

TDG
 UN-No UN1150
 Proper Shipping Name 1,2-DICHLOROETHYLENE
 Hazard Class 3
 Packing Group II

IATA
 UN-No 1150
 Proper Shipping Name 1,2-DICHLOROETHYLENE
 Hazard Class 3
 Packing Group II

IMDG/IMO
 UN-No 1150
 Proper Shipping Name 1,2-DICHLOROETHYLENE
 Hazard Class 3
 Packing Group II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
cis-1,2-Dichloroethylene	X	-	X	205-859-7	-		-	X	X	X	X

Legend:

- X - Listed
- E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
- F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
- N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
- P - Indicates a commenced PMN substance
- R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
- S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
- T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
- XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).
- Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
- Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA

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
cis-1,2-Dichloroethylene	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

Prepared By Regulatory Affairs
 Thermo Fisher Scientific
 Email: EMSDS.RA@thermofisher.com

Creation Date 22-Sep-2009
Revision Date 23-Jan-2018
Print Date 23-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

APPENDIX C

Heat Stress/Cold Stress and Related Illnesses



Heat Stress / Cold Stress and Related Illnesses

1.0 HEAT STRESS

Excessive exposure to a hot environment can bring about a variety of heat-induced disorders. The four main types of heat stress related illnesses: heat rash, heat cramps, heat exhaustion, and heat stroke, are discussed below.

1.1 Heat Rash

Heat rash also known as prickly heat, is likely to occur in hot, humid environments where sweat is not readily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by an infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

1.2 Heat Cramps

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. Drinking large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs or abdomen, but tired muscles (those used to perform the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth (i.e. sports drinks).

Caution should be exercised by people with heart problems or those on low sodium diets who work in hot environments. These people should consult a physician about what to do under these conditions.

1.3 Heat Exhaustion

Heat exhaustion includes several clinical disorders having symptoms that may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from this condition still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

A summary of the key symptoms of heat exhaustion is as follows:

- Clammy skin
- Confusion
- Dizziness
- Fainting
- Fatigue
- Heat Rash
- Light-headedness
- Nausea
- Profuse sweating
- Slurred Speech
- Weak Pulse

In most cases, treatment involves having the victim rest in a cool place and drink plenty of fluids.

Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

As with heat cramps, certain persons should consult with their physician about what to do under these conditions.

1.4 Heat Stroke

This is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

A summary of the key symptoms of heatstroke is as follows:

- Confusion
- Convulsions
- Incoherent Speech
- Staggering Gait
- Unconsciousness
- Sweating stops
- Hot skin, high temperature (yet extremities may feel chilled)

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes moving the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should include continuation of the cooling process and the monitoring of complications that often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

1.5 Preparing for the Heat

Humans, to a large extent, are capable of adjusting to heat. This acclimation to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat tolerable.

On the first day of exposure, body temperature, pulse rate, and general discomfort will be higher. With each succeeding day of exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body does become acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

A gradual exposure to heat gives the body time to become accustomed to higher temperatures, such as those encountered in chemical protective clothing.

1.6 Protecting Against Heat Stress

Several methods that can be used to reduce heat stress:

- Limit duration of work periods
- Use protective clothing with cooling devices
- Enforce the use of the "Buddy System"
- Consume electrolyte solutions prior to suiting up
- Monitor workers for pulse recovery rates, body fluid loss, body weight loss, and excess fatigue
- Screen for heat stress susceptible candidates in your medical surveillance program
- Have all personnel know the signs and symptoms of heat stress

2.0 HEAT STRESS

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, 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 injury, ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at minus 18 degrees Fahrenheit.

Generally, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

2.1 Frostbite

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

- Frost Nip or Initial Frostbite: characterized by suddenly 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.

2.2 Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes rapid cooling of the body to less than 95°F)

- Unconsciousness, glassy stage, slow pulse, and slow respiratory rate
- Freezing of the extremities
- Death

Thermal socks, long cotton or thermal underwear, hardhat liners and other cold weather gear can aid in the prevention of hypothermia. Blankets and warm drinks (other than caffeinated coffee) are also recommended.

Measures shall be taken to keep workers from getting wet, such as issuance of rain gear. Workers whose cloths become wet shall be given the opportunity to dry off and change clothes.

APPENDIX D

Accident and Injury Report Form



Employee's Report of Injury Form

Instructions: Employees shall use this form to report all work related injuries, illnesses, or “near miss” events (which could have caused an injury or illness) – *no matter how minor*. This helps us to identify and correct hazards before they cause serious injuries. This form shall be completed by employees as soon as possible and given to a supervisor for further action.

I am reporting a work related: <input type="checkbox"/> Injury <input type="checkbox"/> Illness <input type="checkbox"/> Near miss	
Your Name:	
Job title:	
Supervisor:	
Have you told your supervisor about this injury/near miss? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Date of injury/near miss:	Time of injury/near miss:
Names of witnesses (if any):	
Where, exactly, did it happen?	
What were you doing at the time?	
Describe step by step what led up to the injury/near miss. (continue on the back if necessary):	
What could have been done to prevent this injury/near miss?	
What parts of your body were injured? If a near miss, how could you have been hurt?	
Did you see a doctor about this injury/illness? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, whom did you see?	Doctor's phone number:
Date:	Time:
Has this part of your body been injured before? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, when?	Supervisor:
Your signature:	Date:

Supervisor's Accident Investigation Form

Name of Injured Person _____

Date of Birth _____ Telephone Number _____

Address _____

City _____ State _____ Zip _____

(Circle one) Male Female

What part of the body was injured? Describe in detail. _____

What was the nature of the injury? Describe in detail. _____

Describe fully how the accident happened? What was employee doing prior to the event? What equipment, tools being using? _____

Names of all witnesses:

Date of Event _____ Time of Event _____

Exact location of event: _____

What caused the event? _____

Were safety regulations in place and used? If not, what was wrong? _____

Employee went to doctor/hospital? Doctor's Name _____

Hospital Name _____

Recommended preventive action to take in the future to prevent reoccurrence.

Supervisor Signature

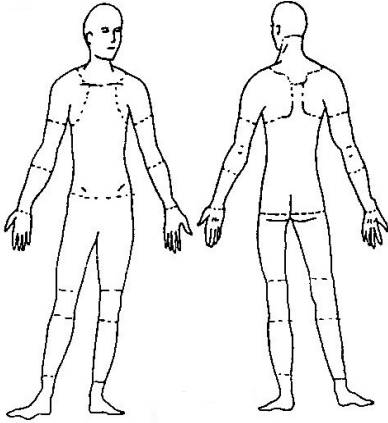
Date

Incident Investigation Report

Instructions: Complete this form as soon as possible after an incident that results in serious injury or illness.
 (Optional: Use to investigate a minor injury or near miss that *could have resulted in a serious injury or illness.*)

This is a report of a: <input type="checkbox"/> Death <input type="checkbox"/> Lost Time <input type="checkbox"/> Dr. Visit Only <input type="checkbox"/> First Aid Only <input type="checkbox"/> Near Miss	
Date of incident:	This report is made by: <input type="checkbox"/> Employee <input type="checkbox"/> Supervisor <input type="checkbox"/> Team <input type="checkbox"/> Other _____

Step 1: Injured employee (complete this part for each injured employee)

Name:	Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female	Age:
Department:	Job title at time of incident:	
Part of body affected: (shade all that apply) 	Nature of injury: (most serious one) <input type="checkbox"/> Abrasion, scrapes <input type="checkbox"/> Amputation <input type="checkbox"/> Broken bone <input type="checkbox"/> Bruise <input type="checkbox"/> Burn (heat) <input type="checkbox"/> Burn (chemical) <input type="checkbox"/> Concussion (to the head) <input type="checkbox"/> Crushing Injury <input type="checkbox"/> Cut, laceration, puncture <input type="checkbox"/> Hernia <input type="checkbox"/> Illness <input type="checkbox"/> Sprain, strain <input type="checkbox"/> Damage to a body system: <input type="checkbox"/> Other _____	This employee works: <input type="checkbox"/> Regular full time <input type="checkbox"/> Regular part time <input type="checkbox"/> Seasonal <input type="checkbox"/> Temporary
		Months with this employer
		Months doing this job:

Step 2: Describe the incident

Exact location of the incident:	Exact time:
What part of employee's workday? <input type="checkbox"/> Entering or leaving work <input type="checkbox"/> Doing normal work activities <input type="checkbox"/> During meal period <input type="checkbox"/> During break <input type="checkbox"/> Working overtime <input type="checkbox"/> Other _____	
Names of witnesses (if any):	

Number of attachments:	Written witness statements:	Photographs:	Maps / drawings:
What personal protective equipment was being used (if any)?			
Describe, step-by-step the events that led up to the injury. Include names of any machines, parts, objects, tools, materials and other important details.			
Description continued on attached sheets: <input type="checkbox"/>			

Step 3: Why did the incident happen?	
Unsafe workplace conditions: (Check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> Inadequate guard <input type="checkbox"/> Unguarded hazard <input type="checkbox"/> Safety device is defective <input type="checkbox"/> Tool or equipment defective <input type="checkbox"/> Workstation layout is hazardous <input type="checkbox"/> Unsafe lighting <input type="checkbox"/> Unsafe ventilation <input type="checkbox"/> Lack of needed personal protective equipment <input type="checkbox"/> Lack of appropriate equipment / tools <input type="checkbox"/> Unsafe clothing <input type="checkbox"/> No training or insufficient training <input type="checkbox"/> Other: _____ 	Unsafe acts by people: (Check all that apply) <ul style="list-style-type: none"> <input type="checkbox"/> Operating without permission <input type="checkbox"/> Operating at unsafe speed <input type="checkbox"/> Servicing equipment that has power to it <input type="checkbox"/> Making a safety device inoperative <input type="checkbox"/> Using defective equipment <input type="checkbox"/> Using equipment in an unapproved way <input type="checkbox"/> Unsafe lifting <input type="checkbox"/> Taking an unsafe position or posture <input type="checkbox"/> Distraction, teasing, horseplay <input type="checkbox"/> Failure to wear personal protective equipment <input type="checkbox"/> Failure to use the available equipment / tools <input type="checkbox"/> Other: _____
Why did the unsafe conditions exist?	
Why did the unsafe acts occur?	
Is there a reward (such as “the job can be done more quickly”, or “the product is less likely to be damaged”) that may have encouraged the unsafe conditions or acts? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:	
Were the unsafe acts or conditions reported prior to the incident? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been similar incidents or near misses prior to this one? <input type="checkbox"/> Yes <input type="checkbox"/> No	

Step 4: How can future incidents be prevented?

What changes do you suggest to prevent this incident/near miss from happening again?

- Stop this activity Guard the hazard Train the employee(s) Train the supervisor(s)
- Redesign task steps Redesign work station Write a new policy/rule Enforce existing policy
- Routinely inspect for the hazard Personal Protective Equipment Other: _____

What should be (or has been) done to carry out the suggestion(s) checked above?

Description continued on attached sheets:

Step 5: Who completed and reviewed this form? (Please Print)

Written by:

Title:

Department:

Date:

Names of investigation team members:

Reviewed by:

Title:

Date:

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 5.0 Revision Date 29.10.2012

Print Date 19.04.2017

GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifiers

Product name : Arsenic

Product Number : 267961

Brand : Aldrich

Index-No. : 033-001-00-X

CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Israel Ltd.
3 PARK RABIN, PLAUT
7670603 REHOVOT
ISRAEL

Telephone : +972 8948-4222

Fax : +972 8948-4200

1.4 Emergency telephone number

Emergency Phone # : +972 (8) 948-4222

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]

Acute aquatic toxicity (Category 1)

Chronic aquatic toxicity (Category 1)

Acute toxicity, Inhalation (Category 3)

Acute toxicity, Oral (Category 3)

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Toxic by inhalation and if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008 [CLP]

Pictogram



Signal word

Danger

Hazard statement(s)

H301 Toxic if swallowed.

H331 Toxic if inhaled.

H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P273 Avoid release to the environment.

P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/

P311 physician.
 Call a POISON CENTER or doctor/ physician.
 P501 Dispose of contents/ container to an approved waste disposal plant.
 Supplemental Hazard Statements none

According to European Directive 67/548/EEC as amended.

Hazard symbol(s)



R-phrase(s)

R23/25

Toxic by inhalation and if swallowed.

R50/53

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S-phrase(s)

S20/21

When using do not eat, drink or smoke.

S28

After contact with skin, wash immediately with plenty of soap and water.

S45

In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S60

This material and its container must be disposed of as hazardous waste.

S61

Avoid release to the environment. Refer to special instructions/ Safety data sheets.

2.3 Other hazards - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula : As
 Molecular Weight : 74,92 g/mol

Component		Concentration
Arsenic		
CAS-No.	7440-38-2	-
EC-No.	231-148-6	
Index-No.	033-001-00-X	

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.

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

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

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

Arsenic oxides

5.3 Advice for firefighters

Wear self contained breathing apparatus for fire fighting 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 dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

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. Provide appropriate exhaust ventilation at places where dust is formed.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end uses

no data available

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

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.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Immersion protection

Material: Nitrile rubber

Minimum layer thickness: 0,11 mm

Break through time: > 480 min

Material tested: Dermatril® (Aldrich Z677272, Size M)

Splash protection

Material: Nitrile rubber

Minimum layer thickness: 0,11 mm

Break through time: > 30 min

Material tested: Dermatril® (Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 873000, 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 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 N99 (US) or type P2 (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).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

- | | |
|---|------------------------------------|
| a) Appearance | Form: powder
Colour: grey |
| b) Odour | no data available |
| c) Odour Threshold | no data available |
| d) pH | no data available |
| e) Melting point/freezing point | Melting point/range: 817 °C - lit. |
| f) Initial boiling point and boiling range | 613 °C - 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 | no data available |
| l) Vapour density | no data available |
| m) Relative density | 5,727 g/mL at 25 °C |
| n) Water solubility | no data available |
| o) Partition coefficient: n-octanol/water | no data available |

- p) Autoignition 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

no data available

10.3 Possibility of hazardous reactions

no data available

10.4 Conditions to avoid

Heat. Exposure to air may affect product quality.

10.5 Incompatible materials

Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

10.6 Hazardous decomposition products

Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - rat - 763 mg/kg

Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - mouse - 145 mg/kg

Remarks: Behavioral:Ataxia. Diarrhoea

Inhalation: no data available

Skin corrosion/irritation

no data available

Serious eye damage/eye irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC: 1 - Group 1: Carcinogenic to humans (Arsenic)

Reproductive toxicity

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

Potential health effects

Inhalation	Toxic if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure

Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

Additional Information

RTECS: CG0525000

12. ECOLOGICAL INFORMATION**12.1 Toxicity**

Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 9,9 mg/l - 96,0 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 3,8 mg/l - 48 h

12.2 Persistence and degradability

no data available

12.3 Bioaccumulative potential

no data available

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

no data available

12.6 Other adverse effects

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. 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**14.1 UN number**

ADR/RID: 1558

IMDG: 1558

IATA: 1558

14.2 UN proper shipping name

ADR/RID: ARSENIC

IMDG: ARSENIC

IATA: Arsenic

14.3 Transport hazard class(es) ADR/RID: 6.1	IMDG: 6.1	IATA: 6.1
14.4 Packaging group ADR/RID: II	IMDG: II	IATA: II
14.5 Environmental hazards ADR/RID: yes	IMDG Marine pollutant: yes	IATA: no
14.6 Special precautions for user no data available		

15. REGULATORY INFORMATION

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
no data available

15.2 Chemical Safety Assessment
no data available

16. OTHER INFORMATION

Further information

Copyright 2012 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

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.

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations
 Date of issue: 12/15/2014 Revision date: 12/15/2014 Version: 1.1

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Substance
 CAS No : 7439-92-1
 Formula : Pb
 Synonyms : C.I. 77575, in massive state / elemental lead, in massive state / glover, in massive state
 BIG no : 10073

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Solder
 Battery: component
 Construction
 Electrodes

1.3. Details of the supplier of the safety data sheet

GSC International, Inc.
 1747 N. Deffer Drive
 Nixa,
 MO 65714
 United States of America

Tel: 417-374-7431
 Fax: 417-374-7442
 Email: info@gscinternationalinc.com

1.4. Emergency telephone number

Country	Organization/Company	Address	Emergency number
MEXICO	Servicio de Informacion Toxicologica Sintox	Tintoreto #32 Edif. a Desp. Col. Nochebuena Mixcoac México, D.F.	1 800 009 2800 +52 55 5611 2634 /+52 55 5598 9095
UNITED STATES OF AMERICA	American Association of Poison Control Centers		1-800-222-1222

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Acute Tox. 4 (Oral) H302
 Acute Tox. 4 (Inhalation) H332
 Carc. 1B H350
 Repr. 1A H360
 STOT RE 2 H373
 Aquatic Acute 1 H400
 Aquatic Chronic 1 H410

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



GHS07

GHS08

GHS09

Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H302+H332 - Harmful if swallowed or if inhaled
 H350 - May cause cancer
 H360 - May damage fertility or the unborn child
 H373 - May cause damage to organs through prolonged or repeated exposure

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long lasting effects

Precautionary statements (GHS-US) :

- 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
- P264 - Wash hands thoroughly after handling
- P270 - Do not eat, drink or smoke when using this product
- P273 - Avoid release to the environment
- P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
- P308+P313 - If exposed or concerned: Get medical advice/attention
- P314 - Get medical advice/attention if you feel unwell
- P501 - Dispose of contents/container to a licensed hazardous-waste disposal contractor or collection site except for empty clean containers which can be disposed of as non-hazardous waste

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Name	Product identifier	%	Classification (GHS-US)
Lead (Main constituent)	(CAS No) 7439-92-1	> 99,9	Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Inhalation), H332 Carc. 1B, H350 Repr. 1A, H360 STOT RE 2, H373 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

4.1. Description of first aid measures

First-aid measures general : If you feel unwell, seek medical advice. IF exposed or concerned: Get medical advice/attention. Call a poison center/doctor/physician if you feel unwell.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. Not applicable. Call a poison center/doctor/physician if you feel unwell.

First-aid measures after skin contact : Not applicable. Wash skin with plenty of water.

First-aid measures after eye contact : Not applicable. Rinse eyes with water as a precaution.

First-aid measures after ingestion : Not applicable. Rinse mouth. Call a poison center/doctor/physician if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : No effects known.

Symptoms/injuries after skin contact : No effects known.

Symptoms/injuries after eye contact : No effects known.

Symptoms/injuries after ingestion : No effects known.

Chronic symptoms : No effects known.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Adapt extinguishing media to the environment.

Unsuitable extinguishing media : No unsuitable extinguishing media known.

5.2. Special hazards arising from the substance or mixture

Fire hazard : DIRECT FIRE HAZARD. Non combustible.

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

- Explosion hazard : DIRECT EXPLOSION HAZARD. No data available on direct explosion hazard. INDIRECT EXPLOSION HAZARD. No data available on indirect explosion hazard.
- Reactivity : On burning: formation of metallic fumes. Oxidizes on exposure to air.

5.3. Advice for firefighters

- Precautionary measures fire : Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to heat: have neighborhood close doors and windows.
- Firefighting instructions : Dilute toxic gases with water spray. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.
- Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus. Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment : Gloves. Protective clothing. See "Material-Handling" to select protective clothing.
- Emergency procedures : Mark the danger area. No naked flames.

6.1.2. For emergency responders

- Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Prevent soil and water pollution. Prevent spreading in sewers. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

- For containment : Not applicable. Collect spillage.
- Methods for cleaning up : Recover mechanically the product. Pick-up the material. Take collected spill to manufacturer/competent authority. Notify authorities if product enters sewers or public waters.
- Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Meet the legal requirements. Do not discharge the waste into the drain. Handle unclean empty containers as full ones. Observe strict hygiene. Measure the concentration in the atmosphere. Carry out operations in the open/under local exhaust/ventilation or with respiratory protection. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust, fume. Use only outdoors or in a well-ventilated area. Take all necessary technical measures to avoid or minimize the release of the product on the workplace. Limit quantities of product at the minimum necessary for handling and limit the number of exposed workers. Provide local exhaust or general room ventilation. Wear personal protective equipment. Floors, walls and other surfaces in the hazard area must be cleaned regularly.
- Hygiene measures : Separate working clothes from town clothes. Launder separately. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Does not require any specific or particular technical measures. Comply with applicable regulations.
- Storage conditions : Store locked up. Store in a well-ventilated place. Keep cool.
- Incompatible materials : Strong acids, strong bases and oxidation agents.
- Heat-ignition : KEEP SUBSTANCE AWAY FROM: heat sources.
- Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: oxidizing agents. Strong acids. Strong bases.
- Storage area : Meet the legal requirements.
- Special rules on packaging : SPECIAL REQUIREMENTS: closing. correctly labeled. meet the legal requirements. Secure fragile packaging in solid containers.

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Lead (7439-92-1)		
ACGIH	ACGIH TWA (mg/m ³)	0,05 mg/m ³
ACGIH	Remark (ACGIH)	CNS & PNS impair
OSHA	Not applicable	

8.2. Exposure controls

Appropriate engineering controls : Provide adequate general and local exhaust ventilation. Ensure good ventilation of the work station.

Personal protective equipment : Protective goggles. Gloves.



Materials for protective clothing : GIVE EXCELLENT RESISTANCE: No data available. GIVE GOOD RESISTANCE: butyl rubber. PVC. GIVE LESS RESISTANCE: No data available. GIVE POOR RESISTANCE: No data available.

Hand protection : protective gloves.

Eye protection : Safety glasses.

Skin and body protection : Not required for normal conditions of use.

Respiratory protection : Wear respiratory protection.

Environmental exposure controls : Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Solid
Appearance	: Metal.
Molecular mass	: 207,20 g/mol
Color	: White to blue-grey
Odor	: Odorless
Odor threshold	: No data available
pH	: No data available
Relative evaporation rate (butyl acetate=1)	: No data available
Melting point	: 327 °C
Freezing point	: No data available
Boiling point	: 1740 °C
Flash point	: Not applicable
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: < 0,1 hPa
Relative vapor density at 20 °C	: No data available
Relative density	: 11,3
Specific gravity / density	: 11340 kg/m ³
Solubility	: insoluble in water. Substance sinks in water. Soluble in nitric acid. Insoluble in organic solvents. Water: < 0,1 g/100ml
Log Pow	: 0,73 (Estimated value)
Log Kow	: No data available

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Viscosity, kinematic : Not applicable
Viscosity, dynamic : No data available
Explosive properties : No data available
Oxidizing properties : No data available
Explosive limits : No data available

9.2. Other information

VOC content : Not applicable (inorganic)

SECTION 10: Stability and reactivity

10.1. Reactivity

On burning: formation of metallic fumes. Oxidizes on exposure to air.

10.2. Chemical stability

Unstable on exposure to air.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

No additional information available

10.5. Incompatible materials

Acids. Bases.

10.6. Hazardous decomposition products

Thermal decomposition generates : fume.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Oral: Harmful if swallowed. Inhalation: Harmful if inhaled.

Lead (Pb) 7439-92-1	
LD50 oral rat	> 2000 mg/kg body weight (Rat; Weight of evidence)
LD50 dermal rat	> 2000 mg/kg body weight (Rat; Experimental value; OECD 402: Acute Dermal Toxicity)
ATE US (oral)	500,000 mg/kg body weight
ATE US (gases)	4500,000 ppmV/4h
ATE US (vapors)	11,000 mg/l/4h
ATE US (dust, mist)	1,500 mg/l/4h
Additional information	Lead massive metal is not considered to be acutely toxic. It is not easily inhaled or ingested, and if it is accidentally ingested normally passes through the gastrointestinal system without significant absorption into the body. Lead is not easily absorbed through the skin.

Skin corrosion/irritation : Not classified
(Based on available data, the classification criteria are not met)
Serious eye damage/irritation : Not classified
(Based on available data, the classification criteria are not met)
Respiratory or skin sensitization : Not classified
(Based on available data, the classification criteria are not met)
Germ cell mutagenicity : Not classified
(Based on available data, the classification criteria are not met)
Carcinogenicity : May cause cancer.

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Lead (7439-92-1)	
Additional information	There is some evidence that inorganic lead compounds may have a carcinogenic effect, and they have been classified by IARC as probably carcinogenic to humans. However, it is considered that this classification does not apply to lead in articles, given the very low bioavailability of metallic lead. Carcinogenicity studies of lead metal powder have been negative. Epidemiology studies of workers exposed to inorganic lead compounds have found a limited association with stomach cancer. IARC has concluded that lead metal is possibly carcinogenic to humans (Group aB).
IARC group	2B - Possibly carcinogenic to humans
National Toxicology Program (NTP) Status	3 - Reasonably anticipated to be Human Carcinogen

Reproductive toxicity	: May damage fertility or the unborn child.
Specific target organ toxicity (single exposure)	: Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (repeated exposure)	: May cause damage to organs through prolonged or repeated exposure.

Lead (7439-92-1)	
Additional information	Lead is a cumulative poison and may be absorbed into the body through ingestion or inhalation. Although inhalation and ingestion of lead in massive form are unlikely, poor hygiene practises may result in hand to mouth transfer which maybe significant over a prolonged period of time. Inorganic lead compounds have been documented in observational human studies to produce toxicity in multiple organ systems and body function including the haemotopoetic (blood) system, kidney function, reproductive function and the central nervous system.

Aspiration hazard	: Not classified (Based on available data, the classification criteria are not met)
Symptoms/injuries after inhalation	: No effects known.
Symptoms/injuries after skin contact	: No effects known.
Symptoms/injuries after eye contact	: No effects known.
Symptoms/injuries after ingestion	: No effects known.
Chronic symptoms	: No effects known.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general	: Dangerous for the environment. Very toxic to aquatic life with long lasting effects.
Ecology - air	: Not dangerous for the ozone layer (Regulation (EC) No 1005/2009). Not included in the list of fluorinated greenhouse gases (Regulation (EC) No 842/2006). TA-Luft Klasse 5.2.2/II.
Ecology - water	: No water pollutant (surface water). Maximum concentration in drinking water: 0.010 mg/l (lead) (Directive 98/83/EC). Highly toxic to aquatic organisms.

Lead (7439-92-1)	
LC50 fish 1	2,8 (0,44 - 542) mg/l (96h) Coughlan, D.J., S.P. Gloss, and J. Kubota 1986. Acute and Sub-Chronic Toxicity of Lead to the Early Life Stages of Small mouth Bass (<i>Micropterus dolomieu</i>). <i>Water Air Soil Pollut.</i> 28(3/4):265-275
EC50 Daphnia 1	4,46 (0,53 - 5,1) mg/l (48h) Govindarajan, S., C.P. Valsaraj, R. Mohan, V. Hariprasad, and R. Ramasubramanian 1993. Toxicity of Heavy Metals in Aquaculture Organisms: <i>Penaeus indicus</i> , <i>Perna viridis</i> , <i>Artemia salina</i> and <i>Skeletonema costatum</i> . <i>Pollut.Res.</i> 12(3):187-189

12.2. Persistence and degradability

Lead (7439-92-1)	
Persistence and degradability	Biodegradability: Not applicable. No (test)data available on mobility of the substance.
ThOD	Not applicable (inorganic)

12.3. Bioaccumulative potential

Lead (7439-92-1)	
Log Pow	0,73 (Estimated value)
Bioaccumulative potential	Low bioaccumulation potential (Log Kow < 4).

12.4. Mobility in soil

No additional information available

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

12.5. Other adverse effects

Effect on ozone layer :

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Reuse or recycle following decontamination. Remove to an authorized dump (Class I). Do not discharge into surface water (2000/60/EC, Council decision 2455/2001/EC, O.J. L331 of 15/12/2001).

Additional information : LWCA (the Netherlands): KGA category 05. Hazardous waste according to Directive 2008/98/EC.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN3077 Environmentally hazardous substances, solid, n.o.s. Lead(7439-92-1), 9, III

UN-No.(DOT) : UN3077

Proper Shipping Name (DOT) : Environmentally hazardous substances, solid, n.o.s.
Lead(7439-92-1)

Department of Transportation (DOT) Hazard Classes : 9 - Class 9 - Miscellaneous hazardous material 49 CFR 173.140

Hazard labels (DOT) : 9 - Class 9 (Miscellaneous dangerous materials)



DOT Symbols : G - Identifies PSN requiring a technical name

Packing group (DOT) : III - Minor Danger

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

DOT Special Provisions (49 CFR 172.102)	: 8 - A hazardous substance that is not a hazardous waste may be shipped under the shipping description "Other regulated substances, liquid or solid, n.o.s.", as appropriate. In addition, for solid materials, special provision B54 applies. 146 - This description may be used for a material that poses a hazard to the environment but does not meet the definition for a hazardous waste or a hazardous substance, as defined in 171.8 of this subchapter, or any hazard class as defined in Part 173 of this subchapter, if it is designated as environmentally hazardous by the Competent Authority of the country of origin, transit or destination. 335 - Mixtures of solids that are not subject to this subchapter and environmentally hazardous liquids or solids may be classified as "Environmentally hazardous substances, solid, n.o.s." UN3077 and may be transported under this entry, provided there is no free liquid visible at the time the material is loaded or at the time the packaging or transport unit is closed. Each transport unit must be leak-proof when used as bulk packaging. A112 - Notwithstanding the quantity limits shown in Column (9A) and (9B) for this entry, the following IBCs are authorized for transportation aboard passenger and cargo-only aircraft. Each IBC may not exceed a maximum net quantity of 1,000 kg: a. Metal: 11A, 11B, 11N, 21A, 21B and 21N b. Rigid plastics: 11H1, 11H2, 21H1 and 21H2 c. Composite with plastic inner receptacle: 11HZ1, 11HZ2, 21HZ1 and 21HZ2 d. Fiberboard: 11G e. Wooden: 11C, 11D and 11F (with inner liners) f. Flexible: 13H2, 13H3, 13H4, 13H5, 13L2, 13L3, 13L4, 13M1 and 13M2 (flexible IBCs must be sift-proof and water resistant or must be fitted with a sift-proof and water resistant liner). B54 - Open-top, sift-proof rail cars are also authorized. IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2). IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner. N20 - A 5M1 multi-wall paper bag is authorized if transported in a closed transport vehicle. T1 - 1.5 178.274(d)(2) Normal..... 178.275(d)(2) TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.
DOT Packaging Exceptions (49 CFR 173.xxx)	: 155
DOT Packaging Non Bulk (49 CFR 173.xxx)	: 213
DOT Packaging Bulk (49 CFR 173.xxx)	: 240
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	: No limit
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75)	: No limit
DOT Vessel Stowage Location	: A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

UN-No. (IMDG)	: 3077
Proper Shipping Name (IMDG)	: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Class (IMDG)	: 9 - Miscellaneous dangerous compounds
Packing group (IMDG)	: III - substances presenting low danger

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Air transport

UN-No.(IATA) : 3077
Proper Shipping Name (IATA) : Environmentally hazardous substance, solid, n.o.s.
Class (IATA) : 9 - Miscellaneous Dangerous Goods
Packing group (IATA) : III - Minor Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Lead (7439-92-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on United States SARA Section 313	
Not listed on the United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	10 lb

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Repr. 1A H360Df
Acute Tox. 4 (Inhalation) H332
Acute Tox. 4 (Oral) H302
STOT RE 2 H373
Aquatic Acute 1 H400
Aquatic Chronic 1 H410
Full text of H-phrases: see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Repr.Cat.1; R61
Repr.Cat.3; R62
Xn; R20/22
R33
N; R50/53

Full text of R-phrases: see section 16

15.2.2. National regulations

Lead (7439-92-1)	
Listed on IARC (International Agency for Research on Cancer)	
Listed as carcinogen on NTP (National Toxicology Program)	

15.3. US State regulations

No additional information available

SECTION 16: Other information

Revision date : 12/15/2014

Lead

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Full text of H-phrases:

Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
Acute Tox. 4 (Oral)	Acute toxicity (oral) Category 4
Aquatic Acute 1	Hazardous to the aquatic environment - Acute Hazard Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment - Chronic Hazard Category 1
Carc. 1B	Carcinogenicity Category 1B
Repr. 1A	Reproductive toxicity Category 1A
STOT RE 2	Specific target organ toxicity (repeated exposure) Category 2
H302	Harmful if swallowed
H332	Harmful if inhaled
H350	May cause cancer
H360	May damage fertility or the unborn child
H373	May cause damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects

NFPA health hazard

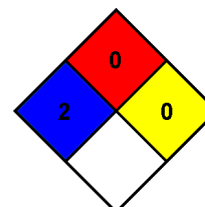
: 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.

NFPA fire hazard

: 0 - Materials that will not burn.

NFPA reactivity

: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health

: * Chronic Hazard - Chronic (long-term) health effects may result from repeated overexposure

Flammability

: 0 Minimal Hazard

Physical

: 0 Minimal Hazard

Personal Protection

: B

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

MERCURY

Safety Data Sheet

According to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 11/19/2013



Mercury Thermometers, Dial Thermometer and Temperature Chart Recorders are considered "manufactured articles," and as such, do not require a SDS. Per 29CFR 1910.1200(c), "Definitions. Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk..."

If broken, the instrument may release quantities of mercury, which should be addressed using the information provided in this SDS.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : MERCURY
CAS No : 7439-97-6
Other means of identification : Colloidal Mercury, Quick Silver, Liquid Silver, NCI-C60399, Hydrargyrum

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Variety of industrial, analytical and research applications.

1.3. Details of the supplier of the safety data sheet

Palmer Instruments, Inc.
234 Old Weaverville Road
Asheville, NC 28804
USA

1.4. Emergency telephone number

Emergency number:: 1-800-373-7542 Hazmat Service, Inc.

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Acute Tox. 1 (Inhalation:dust,mist) H330
Repr. 1B H360
STOT RE 1 H372
Aquatic Acute 1 H400
Aquatic Chronic 1 H410

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :



GHS06



GHS08



GHS09

Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

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

Precautionary statements (GHS-US) :

P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe vapors, gas
P264 - Wash skin, hands 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 eye protection, protective clothing, protective gloves, Face mask
P284 - [In case of inadequate ventilation] wear respiratory protection
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P308+P313 - IF exposed or concerned: Get medical advice/attention
P310 - Immediately call a POISON CENTER/doctor/...
P314 - Get medical advice and attention if you feel unwell
P320 - Specific treatment is urgent (see First aid measures on this label)
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 comply with applicable local, national and international regulation.

2.3. Other hazards

other hazards which do not result in classification

: When inhaled, Mercury will be rapidly distributed throughout the body. During this time, Mercury will cross the blood-brain barrier, and become oxidized to the Hg (II) oxidation state. The oxidized species of Mercury cannot cross the blood-brain barrier and thus accumulates in the

brain. Mercury in other organs is removed slowly from the body via the kidneys. The average half-time for clearance of Mercury for different parts of the human body is as follows: lung: 1.7 days; head: 21 days; kidney region: 64 days; chest: 43 days; whole body: 58 days. Mercury can be irritating to contaminated skin and eye. Prolonged contact may lead to ulceration of the skin. Allergic reactions (i.e. rashes, welts) may occur in sensitive individuals. Mercury can be irritating to contaminated skin and eyes. Short-term over-exposures to high concentrations of mercury vapors can lead to breathing difficulty, coughing, acute, and potentially fatal lung disorders. Depending on the concentration of inhalation over-exposure, heart problems, damage to the kidney, liver or nerves and effects on the brain may occur.

2.4. Unknown acute toxicity (GHS-US)

No Data Available

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

Full text of H-phrases: see section 16

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Mercury	(CAS No) 7439-97-6	100	Acute Tox. 2 (Inhalation), H330 Repr. 1B, H360 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

SECTION 4: First aid measures

4.1 Description of first aid measures

- First-aid measures general : Never give anything by mouth to an unconscious person. If exposed or concerned: Get medical advice/attention.
- First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. Assure fresh air breathing. Allow the victim to rest. Immediately call a POISON CENTER or doctor/physician. In case of irregular breathing or respiratory arrest provide artificial respiration.
- First-aid measures after skin contact : Wash immediately with lots of water (15 minutes)/shower. Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse. Seek immediate medical advice.
- First-aid measures after eye contact : Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Keep eye wide open while rinsing. Seek medical attention immediately.
- First-aid measures after ingestion : Immediately call a POISON CENTER or doctor/physician. Rinse mouth. If conscious, give large amounts of water and induce vomiting. Give water or milk if the person is fully conscious. Obtain emergency medical attention.

4.2 Most important symptoms and effects, both acute and delayed

- Symptoms/injuries after inhalation : Short-term over-exposures to high concentrations of mercury vapors can lead to breathing difficulty, coughing, acute, chemical pneumonia, and pulmonary edema (a potentially fatal accumulation of fluid in the lungs) . Depending on the concentration of over-exposure, cardiac abnormalities, damage to the kidney, liver or nerves and effects on the brain may occur. Long-term inhalation over-exposures can lead to the development of a wide variety of symptoms, including the following: excessive salivation, gingivitis, anorexia, chills, fever, cardiac abnormalities, anemia, digestive problems, abdominal pains, frequent urination, an inability to urinate, diarrhea, peripheral neuropathy (numbness, weakness, or burning sensations in the hands or feet), tremors (especially in the hands, fingers, eyelids, lips, cheeks, tongue, or legs), alteration of tendon reflexes, slurred speech, visual disturbances, and deafness. Allergic reactions (i.e. breathing difficulty) may also occur in sensitive individuals.
- Symptoms/injuries after skin contact : Symptoms of skin exposure can include redness, dry skin, and pain. Prolonged contact may lead to ulceration of the skin. Allergic reactions (i.e. rashes, welts) may occur in sensitive individuals. Dermatitis (redness and inflammation of the skin) may occur after repeated skin exposures.
- Symptoms/injuries after eye contact : Symptoms of eye exposure can include redness, pain, and watery eyes. A symptom of Mercury exposure is discoloration of the lens of the eyes.
- Symptoms/injuries after ingestion : If Mercury is swallowed, symptoms of such over-exposure can include metallic taste in mouth, nausea, vomiting, central nervous system effects, and damage to the kidneys. Metallic mercury is not usually absorbed sufficiently from the gastrointestinal tract to induce an acute, toxic response. Damage to the tissues of the mouth, throat, esophagus, and other tissues of the digestive system may occur. Ingestion may be fatal, due to effects on gastrointestinal system and kidneys.
- Chronic symptoms : Long-term over-exposure can lead to a wide range of adverse health effects. Anyone using Mercury must pay attention to personality changes, weight loss, skin or gum discolorations, stomach pains, and other signs of Mercury over-exposure. Gradually developing syndromes ("Erethism" and "Acrodynia") are indicative of potentially severe health problems. Mercury can cause the development of allergic reactions (i.e. dermatitis, rashes, breathing difficulty) upon prolonged or repeated exposures. Refer to Section 11 (Toxicology Information) for additional data

4.3 Indication of any immediate medical attention and special treatment needed

Treatment for Mercury over-exposure must be given. The following treatment protocol for ingestion of Mercury is from Clinical Toxicology of Commercial Products (5th Edition, 1984).

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2 Special hazards arising from the substance or mixture

Fire hazard : Not flammable. Mercury vapors and oxides generated during fires involving this product are toxic.

Reactivity : Stable. Reacts with (some) metals. Mercury can react with metals to form amalgams.

5.3 Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment. Do not allow run-off from fire fighting to enter drains or water courses.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : Decontaminate all equipment thoroughly after the conclusion of fire-fighting activities.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

General measures : Uncontrolled release should be responded to by trained personnel using pre-planned procedures. Evacuate area. Evacuate personnel to a safe area.

6.1.1 For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2 For emergency responders

Protective equipment : Equip cleanup crew with proper protection. In the event of a release under 1 pound: the minimum level "C" Personal Protective Equipment is needed. Triple-gloves (rubber gloves and nitril gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Air-Purifying Respirator with Cartridge appropriate for Mercury.
In the event of a release over 1 pound or when concentration of oxygen in atmosphere is less than 19.5% or unknown, the level "B" Personal Protective Equipments which includes Self-Contained Breathing Apparatus must be worn.

Emergency procedures : Ventilate area.

6.2 Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters. Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

For containment : For larger spills, dike area and pump into waste containers. Put into a labelled container and provide safe disposal.

Methods for cleaning up : There are a variety of methods which can be used to clean-up Mercury spills. Use a commercially available Mercury Spill Kit for small spills. A suction pump with aspirator can also be used during clean-up operations. For larger release, a Mercury vacuum can be used. Calcium polysulfide or excess sulfur can be also used for clean-up. Mercury can migrate into cracks and other difficult-to-clean areas; calcium polysulfide and sulfur can be sprinkled effectively into these areas. Decontaminate the area thoroughly. The area should be inspected visually and with colorimetric tubes for Mercury to ensure all traces have been removed prior to re-occupation by non-emergency personnel. Decontaminate all equipment used in response thoroughly. If such equipments cannot be adequately decontaminated, it must be discarded with other spill residue. Place all spill residues in an appropriate container, seal immediately, and label appropriately. Dispose of in accordance with federal, state, and local hazardous waste disposal requirements. (Refer to Section 13 of this SDS).

6.4 Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Additional hazards when processed : Supervisors and responsible personnel must be aware of personality changes, weight loss, or other sign of Mercury over-exposure in employees using this product; These symptoms can develop gradually and are indicative of potentially severe health effects related to Mercury contamination.

MERCURY

Safety Data Sheet



according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

- Precautions for safe handling : As with all chemicals, avoid getting Mercury ON YOU or IN YOU. Do not handle until all safety precautions have been read and understood. Obtain special instructions before use. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapor. Report all Mercury releases promptly. Open container slowly on a stable surface. Drums, flasks and bottles of this product must be properly labeled. Empty containers may contain residual amounts of Mercury and should be handled with care.
- Hygiene measures : Do not eat, drink or smoke when using this product. Always wash hands and face immediately after handling this product, and once again before leaving the workplace. Remove contaminated clothing immediately.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Follow practice indicated in Section 6. Make certain that application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment thoroughly before maintenance begins.
- Storage conditions : Keep container tightly closed. Store drums, flasks and bottles in a cool, dry location, away from direct sunlight, source of intense heat, or where freezing is possible. Store away from incompatible materials. Material should be stored in secondary container or in a diked area, as appropriate.
- Incompatible materials : Acetylene and acetylene derivatives, amines, ammonia, 3-bromopropyne, boron diiodophosphide, methyl azide, sodium carbide, heated sulfuric acid, methylsilane/oxygen mixtures, nitric acid/alcohol mixtures, tetracarbonylnickel/oxygen mixtures, alkyne/silver perchlorate mixtures, halogens and strong oxidizers. Mercury can attack copper alloys. Mercury can react with many metals (i.e. calcium, lithium, potassium, sodium, rubidium, aluminum) to form amalgams.
- Prohibitions on mixed storage : Mercury can attack copper alloys. Mercury can react with many metals (i.e. calcium, lithium, potassium, sodium, rubidium, aluminum) to form amalgams.
- Storage area : Storage area should be made of fire-resistant materials.
- Special rules on packaging : Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Mercury (7439-97-6)		
USA ACGIH	ACGIH TWA (mg/m ³)	0,025 mg/m ³
USA OSHA	OSHA PEL (Ceiling) (mg/m ³)	0,1 mg/m ³

8.2. Exposure controls

- Appropriate engineering controls : Ensure adequate ventilation. Ensure exposure is below occupational exposure limits (where available). Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
- Personal protective equipment : Avoid all unnecessary exposure. Gloves. Protective clothing. Safety glasses. Mist formation: aerosol mask.



- Hand protection : Wear neoprene gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 of this SDS.
- Eye protection : Splash goggles or safety glasses. For operation involving the use of more than 1 pound of Mercury, or if the operation may generate a spray of Mercury, the use of a faceshield is recommended.
- Skin and body protection : Wear suitable protective clothing.
- Respiratory protection : Maintain airborne contaminants concentration below provided exposure limits. If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134 or applicable state regulations. Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown.
- Other information : Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Physical state : Liquid
- Color : Silver white.

MERCURY

Safety Data Sheet



according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Odor	: Odorless.
Odor threshold	: Not applicable
pH	: Not applicable
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: No data available
Freezing point	: -38,87 °C (-37.97 F)
Boiling point	: No data available
Flash point	: Not applicable
Self ignition temperature	: Not applicable
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapour pressure	: 0,002 mm Hg at 25°C
Relative vapor density at 20 °C	: 6,9 (Air = 1)
Relative density	: No data available
Relative density of saturated gas/air mixture	: 13,6
Solubility	: No data available
Log Pow	: No data available
Log Kow	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidizing properties	: No data available
Explosive limits	: Not applicable

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable. Reacts with (some) metals. Mercury can react with metals to form amalgams.

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established. Hazardous polymerization will not occur.

10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

Acetylene and acetylene derivatives, amines, ammonia, 3-bromopropyne, boron diiodophosphide, methyl azide, sodium carbide, heated sulfuric acid, methylsilane/oxygen mixtures, nitric acid/alcohol mixtures, tetracarbonylnickel/oxygen mixtures, alkyne/silver perchlorate mixtures, halogens and strong oxidizers. Mercury can attack copper alloys. Mercury can react with many metals (i.e. calcium, lithium, potassium, sodium, rubidium, aluminum) to form amalgams.

10.6. Hazardous decomposition products

If this product is exposed to extremely high temperature in the presence of oxygen or air, toxic vapor of mercury and mercury oxides will be generated.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Fatal if inhaled.
Skin corrosion/irritation	: Not classified pH: Not applicable
Serious eye damage/irritation	: Not classified pH: Not applicable
Respiratory or skin sensitisation	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified Based on available data, the classification criteria are not met

MERCURY

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)



Mercury (7439-97-6)	
IARC group	3

Reproductive toxicity	: May damage fertility or the unborn child. Based on available data, the classification criteria are not met
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Causes damage to organs through prolonged or repeated exposure. Based on available data, the classification criteria are not met Causes damage to organs through prolonged or repeated exposure
Aspiration hazard	: Not classified Based on available data, the classification criteria are not met
Potential adverse human health effects and symptoms	: Based on available data, the classification criteria are not met. Fatal if inhaled.
Symptoms/injuries after inhalation	: Short-term over-exposures to high concentrations of mercury vapors can lead to breathing difficulty, coughing, acute chemical pneumonia, and pulmonary edema (a potentially fatal accumulation of fluid in the lungs) . Depending on the concentration of over-exposure, cardiac abnormalities, damage to the kidney, liver or nerves and effects on the brain may occur. Long-term inhalation over-exposures can lead to the development of a wide variety of symptoms, including the following: excessive salivation, gingivitis, anorexia, chills, fever, cardiac abnormalities, anemia, digestive problems, abdominal pains, frequent urination, an inability to urinate, diarrhea, peripheral neuropathy (numbness, weakness, or burning sensations in the hands or feet), tremors (especially in the hands, fingers, eyelids, lips, cheeks, tongue, or legs), alteration of tendon reflexes, slurred speech, visual disturbances, and deafness. Allergic reactions (i.e. breathing difficulty) may also occur in sensitive individuals.
Symptoms/injuries after skin contact	: Symptoms of skin exposure can include redness, dry skin, and pain. Prolonged contact may lead to ulceration of the skin. Allergic reactions (i.e. rashes, welts) may occur in sensitive individuals. Dermatitis (redness and inflammation of the skin) may occur after repeated skin exposures.
Symptoms/injuries after eye contact	: Symptoms of eye exposure can include redness, pain, and watery eyes. A symptom of Mercury exposure is discoloration of the lens of the eyes.
Symptoms/injuries after ingestion	: If Mercury is swallowed, symptoms of such over-exposure can include metallic taste in mouth, nausea, vomiting, central nervous system effects, and damage to the kidneys. Metallic mercury is not usually absorbed sufficiently from the gastrointestinal tract to induce an acute, toxic response. Damage to the tissues of the mouth, throat, esophagus, and other tissues of the digestive system may occur. Ingestion may be fatal, due to effects on gastrointestinal system and kidneys.
Chronic symptoms	: Long-term over-exposure can lead to a wide range of adverse health effects. Anyone using Mercury must pay attention to personality changes, weight loss, skin or gum discolorations, stomach pains, and other signs of Mercury over-exposure. Gradually developing syndromes ("Erethism" and "Acrodynia") are indicative of potentially severe health problems. Mercury can cause the development of allergic reactions (i.e. dermatitis, rashes, breathing difficulty) upon prolonged or repeated exposures. Refer to Section 11 (Toxicology Information) for additional data.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - water	: Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.
-----------------	--

Mercury (7439-97-6)	
LC50 fishes 1	0,5 mg/l (Exposure time: 96 h - Species: Cyprinus carpio)
EC50 Daphnia 1	5,0 µg/l (Exposure time: 96 h - Species: water flea)
LC50 fish 2	0,16 mg/l (Exposure time: 96 h - Species: Cyprinus carpio [semi-static])

12.2. Persistence and degradability

MERCURY (7439-97-6)	
Persistence and degradability	May cause long-term adverse effects in the environment

12.3 Bioaccumulative potential

MERCURY (7439-97-6)	
Bioaccumulative potential	Not established.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Other information	: Avoid release to the environment.
-------------------	-------------------------------------

MERCURY

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)



SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Waste disposal must be in accordance with appropriate federal, state, and local regulations. This product, if unaltered by use, should be recycled. If altered by use, recycling may be possible. Consult Bethlehem Apparatus Company for information. If Mercury must be disposed of as hazardous waste, it must be handled at a permitted facility or as advised by your local hazardous waste regulatory authority.
- Ecology - waste materials : Hazardous waste due to toxicity. Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

14.1. UN number

- UN-No.(DOT) : 2809
DOT NA no. : UN2809

14.2. UN proper shipping name

- DOT Proper Shipping Name : Mercury
Department of Transportation (DOT) Hazard Classes : 8 - Class 8 - Corrosive material 49 CFR 173.136
Hazard labels (DOT) : 8 - Corrosive substances
6.1 - Toxic substances



- DOT Symbols : A - Material is regulated as a hazardous material only when be transported by air, W - Material is regulated as a hazardous material only when be transported by water
- Packing group (DOT) : III - Minor Danger
- DOT Packaging Exceptions (49 CFR 173.xxx) : 164
- DOT Packaging Non Bulk (49 CFR 173.xxx) : 164
- DOT Packaging Bulk (49 CFR 173.xxx) : 240

14.3. Additional information

- Other information : No supplementary information available.

Overland transport

No additional information available

Transport by sea

- DOT Vessel Stowage Location : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
- DOT Vessel Stowage Other : 40 - Stow "clear of living quarters", 97 - Stow "away from" azides

Air transport

- DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 35 kg
- DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 35 kg

SECTION 15: Regulatory information

15.1. US Federal regulations

Mercury (7439-97-6)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings)	
EPA TSCA Regulatory Flag	S - S - indicates a substance that is identified in a proposed or final Significant New Uses Rule.
SARA Section 313 - Emission Reporting	1,0 %

15.2. International regulations

Canada

MERCURY

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)



Mercury (7439-97-6)	
Listed on the Canadian DSL (Domestic Substances List) inventory.	
WHMIS Classification	Class D Division 1 Subdivision A - Very toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class E - Corrosive Material

EU-Regulations

Mercury (7439-97-6)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances) substances.

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Classification according to Directive 67/548/EEC or 1999/45/EC

Not classified

15.2.2 National regulations

Mercury (7439-97-6)
Listed on the AICS (the Australian Inventory of Chemical Substances)
Listed on Inventory of Existing Chemical Substances (IECSC)
Listed on the Korean ECL (Existing Chemical List) inventory.
Listed on New Zealand - Inventory of Chemicals (NZIoC)
Listed on Inventory of Chemicals and Chemical Substances (PICCS)
Poisonous and Deleterious Substances Control Law
Pollutant Release and Transfer Register Law (PRTR Law)
Listed on the Canadian Ingredient Disclosure List

15.3. US State regulations

Mercury (7439-97-6)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
	Yes			

SECTION 16: Other Information

Other information : None.

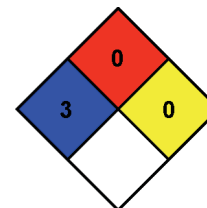
Full text of H-phrases: see section 16:

Acute Tox. 1 (Inhalation:dust,mist)	Acute toxicity (inhalation:dust,mist) Category 1
Acute Tox. 2 (Inhalation)	Acute toxicity (inhalation) Category 2
Aquatic Acute 1	Hazardous to the aquatic environment — AcuteHazard, Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment — Chronic Hazard, Category 1
Repr. 1B	Reproductive toxicity Category 1B
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
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

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



MERCURY

Safety Data Sheet



according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Name	Product identifier	%	GHS-US classification
Mercury	(CAS No) 7439-97-6	100	Acute Tox. 2 (Inhalation), H330 Repr. 1B, H360 STOT RE 1, H372 Aquatic Acute 1, H400 Aquatic Chronic 1, H410

Disclaimer of Expressed and implied Warranties:

Palmer Instruments, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. PALMER INSTRUMENTS, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, PALMER INSTRUMENTS, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

PALMER INSTRUMENTS, INC. (ph) 828-658-3131 (fax) 828-658-0728



Material Safety Data Sheet
Zinc, Granular and Mossy

MSDS# 88125

Section 1 - Chemical Product and Company Identification

MSDS Name: Zinc, Granular and Mossy

Catalog Numbers: AC201450000, AC201455000, AC222600000, AC222600030, AC222601000, AC222605000
AC222605000, AC222610000, AC222610025, AC222611000, AC222615000, Z11-500, Z15-3, Z15-3LC, Z15-500, Z16-500, Z2-3, Z2-500

Synonyms: None

Company Identification: Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410

For information in the US, call: 201-796-7100
Emergency Number US: 201-796-7100
CHEMTREC Phone Number, US: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#: 7440-66-6
Chemical Name: Zinc
%: 100
EINECS#: 231-175-3

Hazard Symbols: N



Risk Phrases: 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Caution! May cause eye and skin irritation. May cause respiratory and digestive tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Target Organs: No data found.

Potential Health Effects

Eye: May cause eye irritation.

Skin: May cause skin irritation. May be harmful if absorbed through the skin.

Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed.

Inhalation: May cause respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May be harmful if inhaled.

Chronic: Repeated inhalation may cause chronic bronchitis.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4

ingestion: cupfuls of milk or water.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Antidote: The use of Calcium disodium EDTA as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire.

Extinguishing Media: Do NOT use water directly on fire. Use dry chemical to fight fire. Use approved class D extinguishing agents or smother with dry sand, clay, or sodium bicarbonate.

Autoignition Temperature: 460 deg C (860.00 deg F)

Flash Point: Not available

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 1; flammability: 1; instability: 0;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation. Do not allow contact with water. Keep from contact with moist air and steam.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Zinc	none listed	none listed	none listed

OSHA Vacated PELs: Zinc: None listed

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if

irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Color: bluish white, silvery gray

Odor: odorless

pH: Not available

Vapor Pressure: 1 mm Hg @ 487 deg C

Vapor Density: Not available

Evaporation Rate: Not applicable

Viscosity: Not applicable

Boiling Point: 907 deg C (1,664.60°F)

Freezing/Melting Point: 419 deg C (786.20°F)

Decomposition Temperature: Not available

Solubility in water: Reacts with water

Specific Gravity/Density: 7.14

Molecular Formula: Zn

Molecular Weight: 65.38

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Incompatible materials, excess heat, strong oxidants, exposure to moist air or water.

Incompatibilities with Other Materials: Oxidizing agents, acids, bases.

Hazardous Decomposition Products: Toxic fumes of zinc oxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 7440-66-6: ZG8600000

LD50/LC50: RTECS: Not available.

Carcinogenicity: Zinc - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Other: Do not empty into drains.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: Not Regulated

Hazard Class:

UN Number:

Packing Group:

Canada TDG

Shipping Name: Not regulated as a hazardous material

Hazard Class:

UN Number:

Packing Group:

USA RQ: CAS# 7440-66-6: 1000 lb final RQ (no reporting of releases of this hazardous substa

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: N

RISK Phrases:

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 60 This material and its container must be disposed of as hazardous waste.

WGK (Water Danger/Protection)

CAS# 7440-66-6: 0

Canada

CAS# 7440-66-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: Not available

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 7440-66-6 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

CAS# 7440-66-6 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 4/09/1998

Revision #6 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 1 of 7

Chromium, Reagent Grade,

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Chromium, Reagent Grade,

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25249A

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:



Environmentally Damaging

Chronic hazards to the aquatic environment, category 1
Acute hazards to the aquatic environment, category 1

Aquatic Acute 1

Aquatic Chronic 1

Signal word :Warning

Hazard statements:

Very toxic to aquatic life with long lasting effects

Precautionary statements:

If medical advice is needed, have product container or label at hand

Keep out of reach of children

Read label before use

Do not eat, drink or smoke when using this product

Avoid release to the environment

Collect spillage

Dispose of contents and container to an approved waste disposal plant

Other Non-GHS Classification:

**WHMIS
NFPA/HMIS**

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 1 of 9

Copper, Granular, 50 Mesh,

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : Copper, Granular, 50 Mesh,

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25268

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:



Toxic

Acute toxicity (oral, dermal, inhalation), category 2



Irritant

Eye irritation, category 2A
Skin sensitization, category 1



Health hazard

Germ cell mutagenicity, category 1A
Specific target organ toxicity following repeated exposure, category 2

Acute toxicity - Oral - Category 2: H300 Fatal if swallowed.

Acute toxicity - Inhalation - Category 2: H330 Fatal if inhaled.

Specific target organ toxicity - Repeated exposure - (Oral,Inhalation) - Category 2: H373 May cause damage to digestive system, hematopoietic system, kidneys, nose, respiratory system, and/or skin through prolonged or repeated exposure if inhaled

Hazards Not Otherwise Classified - Combustible Dust

Not classified for physical or health hazards under GHS.

Hazards Not Otherwise Classified - Combustible Dust

Serious Eye Damage/Eye Irritation - Category 2: H319 Causes serious eye irritation.

Skin sensitizers - Category 1: H317 May cause allergic skin reaction.

Germ cell mutagenicity - Category 1: H340 May cause genetic defects.

Hazardous to aquatic environment - acute hazard - Category 1: H400 Very toxic to aquatic life.

Signal word :Danger

Hazard statements:

Fatal if swallowed

Fatal if inhaled

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 2 of 9

Copper, Granular, 50 Mesh,

May cause an allergic skin reaction
Causes serious eye irritation
May cause genetic defects
May cause damage to organs through prolonged or repeated exposure
Very toxic to aquatic life

Precautionary statements:

If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Wash skin thoroughly after handling
Avoid release to the environment
Do not eat, drink or smoke when using this product
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Avoid breathing dust/fume/gas/mist/vapours/spray
Use only outdoors or in a well-ventilated area
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Wash contaminated clothing before reuse
IF exposed or concerned: Get medical advice/attention
Collect spillage
Specific treatment (see supplemental first aid instructions on this label)
Rinse mouth
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
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
IF ON SKIN: Wash with soap and water
If skin irritation or a rash occurs: Get medical advice/attention
Store locked up
Dispose of contents and container as instructed in Section 13

Combustible Dust Hazard :

May form combustible dust concentrations in air (during processing).

Combustible Dust Hazard :

May form combustible dust concentrations in air (during processing).

Other Non-GHS Classification:

WHMIS

D2B



B4



Safety Data Sheet

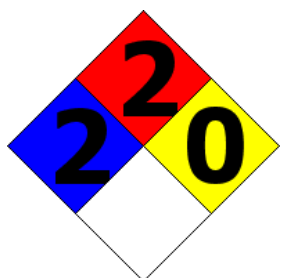
according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 3 of 9

Copper, Granular, 50 Mesh,

NFPA/HMIS



NFPA SCALE (0-4)

Health	2
Flammability	2
Physical Hazard	0
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7440-50-8	Copper	100 %
Percentages are by weight		

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position. Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen. Get medical assistance if cough or other symptoms appear.

After skin contact: Rinse/flush exposed skin gently using soap and water for 15-20 minutes. Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea, Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician. Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition. Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents: None identified.

Special hazards arising from the substance or mixture:

Oxides of copper. Combustion products may include carbon oxides or other toxic vapors. Thermal decomposition can lead to release of irritating gases and vapors. Dust can be an explosion hazard when exposed to heat or flame. Noncombustible solid in bulk form, but powdered form may ignite.

Advice for firefighters:

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 4 of 9

Copper, Granular, 50 Mesh,

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible. Use spark-proof tools and explosion-proof equipment. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols. Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use spark-proof tools and explosion-proof equipment. Ensure that air-handling systems are operational. Ensure adequate ventilation.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13. Should not be released into environment.

Methods and material for containment and cleaning up:

Keep in suitable closed containers for disposal. Wear protective eyewear, gloves, and clothing. Refer to Section 8. Always obey local regulations. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect solids in powder form using vacuum with (HEPA filter). Evacuate personnel to safe areas. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Follow good hygiene procedures when handling chemical materials. Refer to Section 8. Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials. Protect from freezing and physical damage. Keep away from food and beverages. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store in cool, dry conditions in well sealed containers. Store with like hazards

SECTION 8 : Exposure controls/personal protection



Control Parameters:

7440-50-8 , Copper , OSHA PEL TWA (Total Dust) TWA 1 mg/m³
7440-50-8, Copper, ACGIH TLV: 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dusts and mists)
7440-50-8, Copper, OSHA PEL: 0.1 mg/m³ TWA (fume)

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 5 of 9

Copper, Granular, 50 Mesh,

- Appropriate Engineering controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Use under a fume hood
- Respiratory protection:** Not required under normal conditions of use. 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. When necessary use NIOSH approved breathing equipment.
- Protection of skin:** Select glove material impermeable and resistant to the substance. Select glove material based on rates of diffusion and degradation. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves. Wear protective clothing.
- Eye protection:** Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses or goggles are appropriate eye protection.
- General hygienic measures:** Perform routine housekeeping. Wash hands before breaks and at the end of work. Avoid contact with skin, eyes, and clothing. Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Red to brown solid	Explosion limit lower: Explosion limit upper:	Not determined Not determined
Odor:	Odorless	Vapor pressure:	Not determined
Odor threshold:	Not determined	Vapor density:	Not determined
pH-value:	Not determined	Relative density:	Not determined
Melting/Freezing point:	1083°C (1981.4°F)	Solubilities:	Insoluble
Boiling point/Boiling range:	2595°C (4703°F)	Partition coefficient (n-octanol/water):	Not determined
Flash point (closed cup):	Not determined	Auto/Self-ignition temperature:	Not determined
Evaporation rate:	Not determined	Decomposition temperature:	Not determined
Flammability (solid,gaseous):	Not determined	Viscosity:	a. Kinematic: Not determined b. Dynamic: Not determined
Density: 8.94 (Water = 1)			

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 6 of 9

Copper, Granular, 50 Mesh,

SECTION 10 : Stability and reactivity

Reactivity:Stable at room temperature in closed containers under normal storage and handling conditions.

Chemical stability:Stable under normal conditions.

Possible hazardous reactions:None under normal processing

Conditions to avoid:Incompatible Materials.Dust formation.Moisture.Exposure to air.

Incompatible materials:Liquid copper explodes on contact with water. Reacts violently with ammonium nitrate, bromates, iodates, chlorates, ethylene oxide, hydrazoic acid, potassium oxide, dimethyl sulfoxide Page 3 of 4
CU4500 + trichloroacetic acid, hydrogen peroxide, sodium peroxide, sodium azide, sulfuric acid, hydrogen sulfide + air, and lead azide. Ignites on contact with chlorine, fluorine (above 121C), chlorine trifluoride, and hydrazinium nitrate (above 70C). Incompatible with 1-bromo-2-propyne, potassium dioxide, and acetylenic compounds.

Hazardous decomposition products:Oxides of copper.

SECTION 11 : Toxicological information

Acute Toxicity:		
Oral:	7440-50-8	LD50, Rat 472mg/KG
Chronic Toxicity:		
Oral:	7440-50-8	Chronic copper poisoning is typified by hepatic cirrhosis, brain damage and demyelination, kidney defects, and copper deposition in the cornea as exemplified by humans with Wilson's disease. It has also been reported that copper poisoning has led to hemolytic anemia and accelerates arteriosclerosis.
Corrosion Irritation:		
Dermal:	7440-50-8	Dust is irritating to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
Sensitization:		No additional information.
Single Target Organ (STOT):		No additional information.
Numerical Measures:		No additional information.
Carcinogenicity:		No additional information.
Mutagenicity:		Please refer to RTECS# BO9000000 for specific informaton.
Reproductive Toxicity:		Fertility: Post-implantation mortality, oral-rat TDLo=40mg/kg.

SECTION 12 : Ecological information

Ecotoxicity

Freshwater fish: 96 Hr LC50 Pimephales promelas: 0.0068 - 0.0156 mg/L; 96 Hr LC50 Pimephales promelas:

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 7 of 9

Copper, Granular, 50 Mesh,

<0.3 mg/L [static]; 96 Hr LC50 Pimephales promelas: 0.2 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.052 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 1.25 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 0.3 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 0.8 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 0.112 mg/L [flow-through]

Water flea: 48 Hr EC50 Daphnia magna: 0.03 mg/L [Static]

Persistence and degradability: No information available.

Bioaccumulative potential: No information available.

Mobility in soil:

Other adverse effects: No information available.

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Contact a licensed professional waste disposal service to dispose of this material. Dispose of empty containers as unused product. Product or containers must not be disposed with household garbage. It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). 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. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

3089

UN proper shipping name

Metal Powder, Flammable, NOS (Copper Sulfate)

Transport hazard class(es)



Class:

4.1 Flammable solids, self-reactive substances and solid desensitized explosives

Packing group:II

Environmental hazard:

Transport in bulk:

Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

Acute, Chronic, Fire

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

7440-50-8 Copper Sulfate 5000 Lbs

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 8 of 9

Copper, Granular, 50 Mesh,

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

None of the ingredients is listed

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations. Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:

IMDG: International Maritime Code for Dangerous Goods

PNEC: Predicted No-Effect Concentration (REACH)

CFR: Code of Federal Regulations (USA)

SARA: Superfund Amendments and Reauthorization Act (USA)

RCRA: Resource Conservation and Recovery Act (USA)

TSCA: Toxic Substances Control Act (USA)

NPRI: National Pollutant Release Inventory (Canada)

DOT: US Department of Transportation

IATA: International Air Transport Association

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

ACGIH: American Conference of Governmental Industrial Hygienists

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

WHMIS: Workplace Hazardous Materials Information System (Canada)

DNEL: Derived No-Effect Level (REACH)

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 03.02.2015

Page 9 of 9

Copper, Granular, 50 Mesh,

Effective date : 03.02.2015

Last updated : 03.19.2015

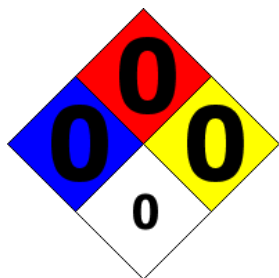
Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 2 of 7

Chromium, Reagent Grade,



NFPA SCALE (0-4)

Health	0
Flammability	0
Physical Hazard	0
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:

CAS 7440-47-3	Chromium	>98 %
Percentages are by weight		

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position. Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen. Get medical assistance if cough or other symptoms appear.

After skin contact: Rinse/flush exposed skin gently using soap and water for 15-20 minutes. Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea, Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician. Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition. Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors. Thermal decomposition can lead to release of irritating gases and vapors.

Advice for firefighters:

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 3 of 7

Chromium, Reagent Grade,

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible. Use spark-proof tools and explosion-proof equipment. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols. Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Ensure that air-handling systems are operational. Ensure adequate ventilation.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13. Should not be released into environment.

Methods and material for containment and cleaning up:

Keep in suitable closed containers for disposal. Wear protective eyewear, gloves, and clothing. Refer to Section 8. Always obey local regulations. Evacuate personnel to safe areas.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Follow good hygiene procedures when handling chemical materials. Refer to Section 8. Avoid release to the environment. Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials. Protect from freezing and physical damage. Keep away from food and beverages. Provide ventilation for containers. Store in cool, dry conditions in well sealed containers. Store with like hazards

SECTION 8 : Exposure controls/personal protection



Control Parameters:

7440-47-3, Chromium, NIOSH REL: TWA 0.5 mg/m³

Appropriate Engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Use under a fume hood

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 4 of 7

Chromium, Reagent Grade,

Respiratory protection:	Not required under normal conditions of use. 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. When necessary use NIOSH approved breathing equipment.
Protection of skin:	Select glove material impermeable and resistant to the substance. Select glove material based on rates of diffusion and degradation. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves. Wear protective clothing.
Eye protection:	Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses or goggles are appropriate eye protection.
General hygienic measures:	Perform routine housekeeping. Wash hands before breaks and at the end of work. Avoid contact with skin, eyes, and clothing. Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Silver-gray solid	Explosion limit lower: Explosion limit upper:	Not determined Not determined
Odor:	Not Determined	Vapor pressure:	Not determined
Odor threshold:	Not determined	Vapor density:	Negligible
pH-value:	Not Determined	Relative density:	Not determined
Melting/Freezing point:	1857.2°C (3374.96°F)	Solubilities:	insoluble
Boiling point/Boiling range:	2642°C (4787.6°F)	Partition coefficient (n-octanol/water):	Not determined
Flash point (closed cup):	Not determined	Auto/Self-ignition temperature:	Not determined
Evaporation rate:	Not determined	Decomposition temperature:	Not determined
Flammability (solid,gaseous):	Not determined	Viscosity:	a. Kinematic: Not determined b. Dynamic: Not determined
Density: 7.2 @ 28°C			

SECTION 10 : Stability and reactivity

Reactivity: Nonreactive under normal conditions.
Chemical stability: Stable under normal conditions.
Possible hazardous reactions: None under normal processing
Conditions to avoid: Incompatible Materials.
Incompatible materials: Strong acids. Strong bases. Oxidizing agents.
Hazardous decomposition products:

SECTION 11 : Toxicological information

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 5 of 7

Chromium, Reagent Grade,

Acute Toxicity: No additional information.

Chronic Toxicity: No additional information.

Corrosion Irritation: No additional information.

Sensitization: No additional information.

Single Target Organ (STOT): No additional information.

Numerical Measures: No additional information.

Carcinogenicity: No additional information.

Mutagenicity: No additional information.

Reproductive Toxicity: No additional information.

SECTION 12 : Ecological information

Ecotoxicity

Toxicity to fish: LC50 - Cyprinus carpio (Carp) - 14.3 mg/l - 96 h

Persistence and degradability:

Bioaccumulative potential:

Mobility in soil:

Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Contact a licensed professional waste disposal service to dispose of this material. Dispose of empty containers as unused product. Product or containers must not be disposed with household garbage. It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). 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. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

3077

UN proper shipping name

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Chromium)

Transport hazard class(es)



Class:

9 Miscellaneous dangerous substances and articles

Packing group: Marine pollutant

Environmental hazard:

Transport in bulk:

Special precautions for user:

SECTION 15 : Regulatory information

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 6 of 7

Chromium, Reagent Grade,

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

None of the ingredients is listed

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

7440-47-3 Chromium: RQ 5000 LB

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

7440-47-3 Chromium

Canadian NPRI Ingredient Disclosure list (limit 1%):

None of the ingredients is listed

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations. Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 10.24.2014

Page 7 of 7

Chromium, Reagent Grade,

GHS: Globally Harmonized System of Classification and Labelling of Chemicals

ACGIH: American Conference of Governmental Industrial Hygienists

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

WHMIS: Workplace Hazardous Materials Information System (Canada)

DNEL: Derived No-Effect Level (REACH)

PNEC: Predicted No-Effect Concentration (REACH)

CFR: Code of Federal Regulations (USA)

SARA: Superfund Amendments and Reauthorization Act (USA)

RCRA: Resource Conservation and Recovery Act (USA)

TSCA: Toxic Substances Control Act (USA)

NPRI: National Pollutant Release Inventory (Canada)

DOT: US Department of Transportation

Effective date : 10.24.2014

Last updated : 03.19.2015

APPENDIX G
O&M MANUAL (FOR EACH ACTIVE EC)

A OM&M plan will be provided in the event that the SSD becomes active.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 1

SUNY @ Stony Brook, 50 Circle Road, Stony Brook, NY 11790

P: (631) 444-0240 | F: (631) 444-0248

www.dec.ny.gov

September 29, 2022

Steven E. Panter, CGWP, PG
Senior Consultant
Fleming-Lee Shue, Inc.
158 West 29th Street
New York, NY, 10001

Re: SSDS Design Document
175 Roger Avenue site
NYSDEC Site #: C130164
Inwood, Nassau County


Dear Mr. Panter:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed Fleming-Lee Shue Environmental Engineering and Geology's revised Sub Slab Depressurization System (SSDS) Design Document dated September 23, 2022 for the 175 Roger Avenue site, Inwood, Nassau County. The design document provides a detailed description of the SSDS that will be installed as part of the construction of the proposed 69,711 square foot single story warehouse. The building is to be constructed at the site as part of the planned site redevelopment.

Once the proposed warehouse is completed, a soil vapor intrusion (SVI) evaluation will be conducted. Based on the results of the SVI evaluation, the SSDS may have to be modified to convert it to an active system. Should this be required, an evaluation of the system will be conducted to ensure it is operating effectively in mitigating the negative impacts associated with SVI.

The Department's has completed its review of the proposed design document and the design appears complete and thus approved. If you should have any questions, please contact me at (631)-444-0244 or via e-mail at john.sheehan@dec.ny.gov

Sincerely,

A handwritten signature in black ink, appearing to read "John C. Sheehan". The signature is fluid and cursive, with the first name "John" being the most prominent.

John C. Sheehan, P.G.
Professional Geologist 1

cc: R. Mustico, NYSDEC
C. Engelhardt, NYSDEC
G. Desai, NYSDEC
C. Bethoney, NYSDOH
D. Tucholski, NYSDOH
A. Mann, Inwood 175, LLC



September 23, 2022

Sent via e-mail: john.sheehan@dec.ny.gov

Mr. John Sheehan, PG
New York State Department of Environmental Conservation
Division of Environmental Remediation 1
50 Circle Road
Stony Brook, NY 11790

**Re: 175 Roger Avenue – Sub-slab Depressurization System (SSD)
Inwood, NY 11096
BCP Site No. C130164**

Dear Mr. Sheehan:

Fleming, Lee Shue Environmental Engineering and Geology D.P.C. (FLS), on behalf of Inwood 175, LLC & AJM Capital II, LLC, the Volunteer, presents this proposed Sub-slab Depressurization System (SSD) plan for the 175 Roger Avenue site (Site).

Background

Soil vapor was sampled during the 2020 Supplemental Remedial Investigation (SRI). A total of 17 soil vapor samples were collected throughout the entire Site footprint in 2020 (there are no Site buildings). Of the 69 Volatile Organic Compounds (VOCs) analyzed for all samples by USEPA Method TO-15, nearly half (34/69) of all results were below reporting limits. A breakdown of the soil vapor dataset for the key compounds including chlorinated VOCs, acetone, MEK and their associated degradation by-products is provided in Table 1.

Table 1 – Soil Vapor Results Summary, 2020, $\mu\text{g}/\text{m}^3$

Soil Vapor VOCs	No. Obs.	Min	p25	p50	p75	Max	NYSDOH Ambient Air Guidance Value
Methylene Chloride	17	1.7	2.1	3.1	4.9	21	60
Tetrachloroethene (PCE)	17	nd	0.14	1.5	14	548	30
Trichloroethene (TCE)	17	nd	0.04	0.45	3.4	55.4	2
Carbon Tetrachloride	17	nd	nd	nd	nd	nd	
Chloroform	17	nd	nd	nd	nd	nd	
Chloromethane	17	nd	nd	nd	nd	0.91	
1,2-Dichloroethane	17	nd	nd	nd	nd	3.6	
1,1-Dichloroethene	17	nd	nd	nd	nd	nd	
1,1-Dichloroethane	17	nd	nd	nd	nd	nd	
cis-1,2-Dichloroethene	17	nd	nd	nd	nd	nd	
Vinyl Chloride	17	nd	nd	nd	nd	nd	
Acetone	17	7.1	42.3	54.6	73.9	375	
2-Butanone (MEK)	17	nd	1.4	2	2.6	10	

PCE and TCE data summaries computed using Regression on Order Statistics (ROS) to account for non-detects and variable detection limits. Min. – minimum value, p25 – 25th percentile, p50 – 50th percentile, p75 – 75th percentile, Max – maximum value. nd - non-detect.

The results for most of the VOCs in Table 1 are below reporting limits or are at very low concentrations. Of the detected compounds, the maximum methylene chloride soil vapor concentration ($21 \mu\text{g}/\text{m}^3$) is well below the New York State Department of Health (NYSDOH) Ambient Air Guidance Value of $60 \mu\text{g}/\text{m}^3$. For PCE, the VOC with the historic highest groundwater concentrations, all but three of the 17 sample locations had results below the NYSDOH Ambient Air Guidance Value of $30 \mu\text{g}/\text{m}^3$. The sample results above this guideline were $43 \mu\text{g}/\text{m}^3$, $111 \mu\text{g}/\text{m}^3$, and $548 \mu\text{g}/\text{m}^3$. These samples were located on the eastern side of the Site with the two highest concentrations located near the Site's eastern boundary.

For TCE, five of the 17 soil vapor sample results were above the NYSDOH Ambient Air Guidance Value of $2 \mu\text{g}/\text{m}^3$. The samples measured $6.4 \mu\text{g}/\text{m}^3$, $3.4 \mu\text{g}/\text{m}^3$, $12 \mu\text{g}/\text{m}^3$, $53.7 \mu\text{g}/\text{m}^3$, and $55.4 \mu\text{g}/\text{m}^3$. Similar to the PCE results, these samples were located on the eastern side of the Site, with the two highest concentrations present near the eastern Site border. Other than these locations, the balance of the Site had PCE and TCE soil vapor concentrations below the NYSDOH Ambient Air Guidance Values.

Overall concentrations of VOCs in soil vapor on Site were largely below reporting limits or below NYSDOH Ambient Air Guidance Values. Where detected, half or more of the VOC concentrations are below the NYSDOH Ambient Air Guidance Values. Therefore, on balance, VOC levels in soil vapor exhibit very low concentrations and even the maximum VOC concentrations for PCE ($548 \mu\text{g}/\text{m}^3$) and TCE ($55.4 \mu\text{g}/\text{m}^3$) themselves are too low to pose a credible vapor intrusion concern as indicated by USEPA.

USEPA recommends an Attenuation Factor (AF) for soil gas to indoor air of 0.03.¹ Applying the AF to the maximum soil vapor concentrations yields levels below their respective PCE (548 $\mu\text{g}/\text{m}^3$ --> 16.4 $\mu\text{g}/\text{m}^3$) and TCE (55.4 $\mu\text{g}/\text{m}^3$ --> 1.7 $\mu\text{g}/\text{m}^3$) Ambient Air Guidance values. Thus, even with no engineering controls, soil vapor would not be expected to pose a risk to indoor air. In practice, the AF would be expected to result in far lower VOC concentrations considering the entire dataset of soil vapor values.²

On top of this condition, there will be at least approximately five feet of clean imported fill beneath the proposed warehouse building, a vapor barrier installed beneath the foundation using material specifically designed for commercial/industrial use, and a minimum 7-inch-thick new concrete slab. All of these engineering controls together will prevent soil vapor intrusion into indoor air and support the use of a passive SSD beneath the new building floor slab. Given the relatively low soil vapor intrusion potential and the supplementary mitigative measures, it is highly unlikely that the SSD will be required to be activated. Nonetheless, as a contingency measure, the SSD will be installed such that it may be converted to an active SSD should subsequent indoor air sampling warrant activation.

Following construction and prior to occupancy, the SSD will be passive. As such, indoor air and sub-slab samples will need to be collected to evaluate the data and determine if the SSD needs to be converted to an active system. The determination will be made by evaluating the sampling data in conjunction with the New York State Department of Health Guidance for evaluating Soil Vapor Intrusion in the State of New York (including applicable updates) and the Department's DER-10 Technical Guidance for Site Investigation and Remediation document.

Basis of Active SSD Design

If activation of the SSD becomes necessary based on indoor air testing, the goal of the SSD design is to establish depressurization beneath the entire building floor to prevent vapors from reaching the indoor space. If activated, once the conversion to the active system is completed, then an additional round of indoor air sampling will be required to confirm the SSD is operating effectively in addressing the potential negative impacts associated with soil vapor intrusion.

One radon vacuum fan will be installed on each of the six SSD risers (Figures 1 and 2). If the SSD needs to be converted to an active system, the radius of influence will need to be determined to ensure that the entire slab of the building is depressurized. Vacuum should be at least 0.02 inches of water column. As such, permanent sub-slab testing points will need to be installed throughout the slab during building construction

-
1. *Vapor Intrusion Investigations and Decision-Making: A Critical Review*. Jie Ma, Thomas McHugh, Lila Beckley, Matthew Lahvis, George DeVaul, and Lin Jiang. *Environmental Science & Technology* 2020 54 (12), 7050-7069. DOI: 10.1021/acs.est.0c00225.

USEPA. *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air*, OSWER Publication 9200.2-154; U.S. Environmental Protection Agency: Washington, DC, USA, 2015.

² This was before the Site was remediated. During remediation the concrete slab was removed and soils exposed to sun and heat for much of the Summer of 2022. This condition would be expected to further reduce the already low VOC soil vapor concentrations.

(Figure 1). The testing points will need to provide enough coverage of the slab to determine if the entire slab is depressurized.

Please contact us if you have any questions or require additional information.

Sincerely,

Fleming, Lee Shue Environmental Engineering and Geology D.P.C.

A handwritten signature in black ink that reads "Arnold F. Fleming". The signature is written in a cursive style with a large, looping flourish at the end.

Arnold F. Fleming, P.E.
President

c: A. Mann, AJM
S. Panter, FLS

Fleming
Lee Shue

158 West 29th Street, 9th Fl.
New York, NY 10001

175 Roger Avenue
Inwood, NY

Figure 1

Preliminary SSDS Design

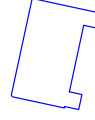
May 2022

Project Number
10188-017

LEGEND

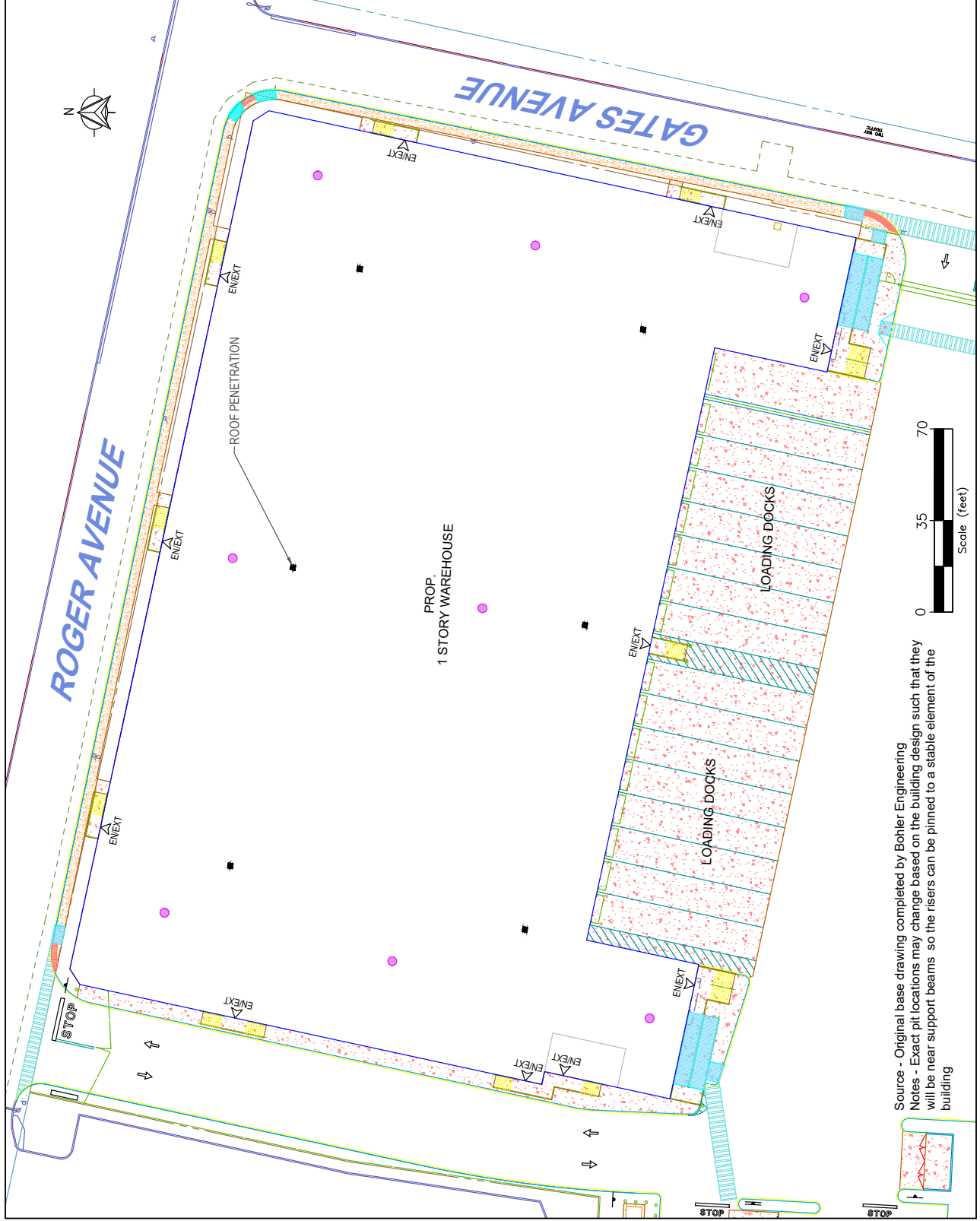


SSDS Pit



1 Story Warehouse

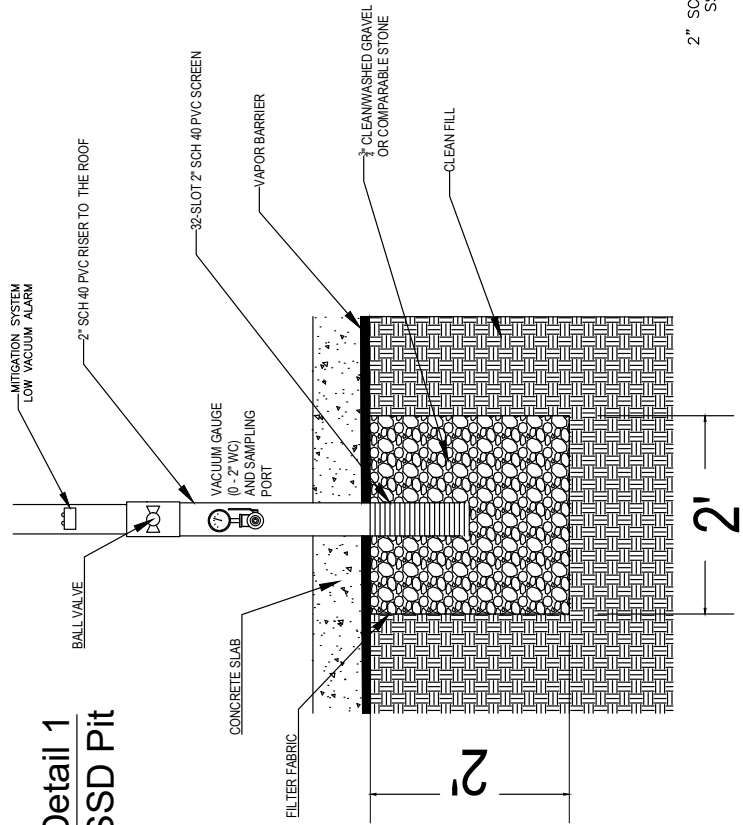
Monitoring Point



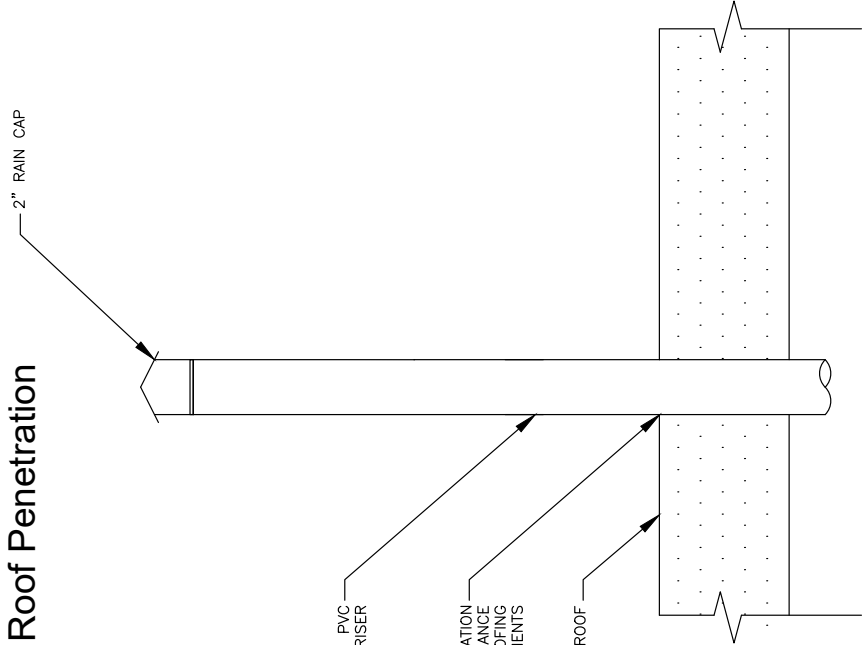
Source - Original base drawing completed by Bohler Engineering
Notes - Exact pit locations may change based on the building design such that they will be near support beams - so the risers can be pinned to a stable element of the building

*Not to scale
 **Vacuum gauge and alarm installation are contingent on system being activated

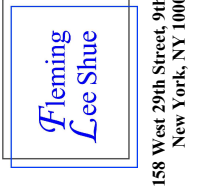
Detail 1 SSD Pit



Detail 2 Roof Penetration



- NOTES:
- DRAWING NOT TO BE USED FOR STRUCTURAL, ARCHITECTURAL, OR OTHER REFERENCE EXCEPT FOR SUB-SLAB DEPRESSURIZATION SYSTEM.
 - CONTRACTOR TO VERIFY THAT VENT STACK EXHAUST LOCATION IS A DISTANCE OF 10 FEET OR MORE FROM ANY FRESH AIR INTAKES OR OPERABLE WINDOWS (INCLUDING THOSE ON ADJOINING PROPERTIES). FINAL LOCATION AND HEIGHT OF VENT STACKS SHALL BE IN ACCORDANCE WITH LOCAL APPLICABLE BUILDING CODE.
 - VENT STACKS SHALL BE SECURELY ANCHORED WITH METAL FASTENERS TO STRUCTURE.
 - IF A CONFLICT ARISES BETWEEN THE SSDS PIPING AND STRUCTURAL ARCHITECTURAL OR MEP ELEMENTS OF THE BUILDING, THE SSDS PIPING CAN BE REALIGNED AS NECESSARY TO AVOID THE CONFLICT. SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO INSTALLATION.
 - DRAWING FOR APPROVAL PRIOR TO INSTALLATION OF SSDS RISER ROOF PENETRATION PRIOR TO WATERPROOFING OF THE ROOF.
 - SYSTEM IS DESIGNED TO BE PASSIVE. IF AN ACTIVE SSDS IS REQUIRED, A RADON BLOWER WILL BE INSTALLED ON THE ROOF OF EACH VERTICAL RISER. VACUUM GAUGE AND ALARM INSTALLATION ARE ALSO CONTINGENT ON THE SYSTEM BEING CONVERTED TO ACTIVE.



158 West 29th Street, 9th Fl.
 New York, NY 10001

175 Roger Avenue
 Inwood, NY

Figure 2

Typical SSDS
 Details

May 2022

Project Number
 10188-017

LEGEND

APPENDIX H
QUALITY ASSURANCE PROJECT PLAN

175 Roger Avenue Commercial Development
175 Roger Avenue, Inwood, Nassau County, New York

NYSDEC BCP# C130164

QUALITY ASSURANCE PROJECT PLAN

Prepared for:

Inwood 175, LLC & AJM Capital II, LLC
New York, New York 10111

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region One
Stony Brook University
50 Circle Road
Stony Brook, NY 11790-3409

Fleming Engineering
158 West 29th Street, 9th Floor
New York, New York 10001

September 2020

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT TEAM	1
2.1	Remedial Engineer.....	1
2.2	Project Director	1
2.3	Project Manager.....	1
2.4	Field Team Leader	2
2.5	Project Quality Assurance / Quality Control Officer	2
2.6	Laboratory Quality Assurance / Quality Control Officer	2
3.0	LABORATORY PROCEDURES	2
3.1	Laboratory Methods.....	2
3.2	Quality Control Sampling	2
4.0	STANDARD OPERATING PROCEDURES	3
4.1	Direct Push Soil Sampling	3
4.2	Remedial Excavation Sampling Procedures	4
4.3	Monitoring Well Installation.....	4
4.4	Groundwater Sampling	5
4.4	Sample Handling	6
4.4.1	Sample Identification.....	6
4.4.2	Sample Custody	8
4.5	Decontamination Procedures.....	8
4.6	Field Instrumentation.....	8
5.0	DOCUMENTATION AND RECORDS	8
5.1	Documentation Standards	8
5.2	Laboratory Data Packages.....	9
5.3	Data Usability Summary Reports and Electronic Data Deliverable.....	9

LIST OF FIGURES

Figure 1	Site Location
Figure 2	Site Map

QUALITY ASSURANCE PROJECT PLAN
175 Roger Avenue, Inwood, New York
BCP# C130164

LIST OF TABLES

Table 1 Summary of Analytical Methods/Quality Assurance

Table 2 Summary of Quality Control Samples

LIST OF APPENDICES

Appendix 1 – Personnel Qualifications

1.0 INTRODUCTION

The Quality Assurance Project Plan (QAPP) outlines the protocols and procedures that will be followed during field sampling at the 175 Roger Avenue site, located at 175 Roger Avenue, Inwood (Nassau County), NY, (hereafter referred to as the “Site”). The Site is part of the Brownfield Cleanup Program (BCP# C130164) administered by the New York State Department of Environmental Conservation (NYSDEC). A Site Location Map is included as Figure 1. A Site plan is included as figure 2. This QAPP has been prepared in order to ensure Quality Assurance (QA) and Quality Control (QC) for the environmental sampling activities which will be conducted during field sampling and to ensure the acquisition of defensible data.

2.0 PROJECT TEAM

The project team will consist of Fleming Engineering (FE) personnel and subcontractors. All field personnel and subcontractors will have completed a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and the annual HAZWOPER 8-hour refresher in accordance with the Occupational Safety and Health Administration (OSHA) regulations and will have the training required for their respective duties as outlined for this work plan. The project team qualifications are provided in Attachment I.

2.1 Remedial Engineer

The oversight of all aspects of the project will be conducted by the Remedial Engineer (RE). The RE is responsible for compliance with the RAWP or current Site management document. Mr. Arnold F. Fleming, P.E., will act as the RE for any and all investigatory and remedial actions at the Site conducted as part of the BCP.

2.2 Project Director

The general oversight of all aspects of the project will be conducted by the Project Director. Tasks include coordinating with project manager and RE on decision-making throughout the project. Mr. Mark Hutson, PG will act as the Project Director for the remediation.

2.3 Project Manager

All components of the remedial action will be directed and coordinated by the Project Manager. The Project Manager will ensure a smooth flow of information between all parties involved in the remediation by communicating regularly with professionals from the New York State Department of Environmental Conservation (NYSDEC), the BCP Participant and their representatives, the remedial engineer, contractors, Site building owner/management and all members of the FE project team. Tasks will include the scheduling, budgeting, data management and decision-making for the field program. Mr. Steven Panter, CGWP, P.G., Senior Consultant will act as the Project Manager for the project.

2.4 Field Team Leader

Daily onsite sampling and health and safety activities will be supervised by a Field Team Leader. The Team Leader's responsibilities will include ensuring adherence to the RAWP and Health and Safety Plan (HASP) and regularly reporting daily progress and deviations from the RAWP to the Project Manager. FE will assign the role of Field Team Leader to appropriate FLS personnel.

2.5 Project Quality Assurance / Quality Control Officer

Adherence to the QAPP will be ensured by a FLS QA/QC Officer. Tasks will include reviewing the QA procedures with all personnel before any fieldwork is conducted onsite as well as completing periodic site visits in order to assess the implementation of these procedures. Mr. Joel Kane will act as the QA/QC officer for the remedial action.

2.6 Laboratory Quality Assurance / Quality Control Officer

Quality control procedures will be ensured by the selected laboratory, SGS, QA/QC officer. This officer will be responsible for the adherence to laboratory protocols, quality control procedures, and checks in the laboratory. The officer will track the movement of the samples from check-in to issue of the analytical results, conducting a final check on the analytical calculations. The laboratory groups performing the respective analyses will complete their own QA/QC and sign off on the data. The SGS QA/QC manual is attached to the end of this document.

3.0 LABORATORY PROCEDURES

3.1 Laboratory Methods

The sample container type, preservation, applicable holding time, and laboratory methods of analysis of the field samples have been included as Table 1. Holding times are based on the SW-846 analytical method which, when adjusted to account for an assumed 2-day sample shipping time, match NYSDEC Analytical Services Protocol (ASP) holding times. Sample analyses will be completed by a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and reported as NYSDEC ASP Category B deliverables.

3.2 Quality Control Sampling

Additional analysis will be conducted for quality control assurance in addition to the laboratory analysis of the field soil and groundwater samples. Quality control samples will include: equipment rinsate blanks, duplicate samples, and trip blanks. The quantities of field samples and quality control samples have been summarized in Table 2.

The equipment blank and duplicate samples will be analyzed for the same parameters as the samples, as shown on Table 1.

4.0 STANDARD OPERATING PROCEDURES

The standard operating procedures for the soil sampling, groundwater sampling, and sampling equipment decontamination have been described in the following sections. Safety monitoring will be performed in accordance with the Site-specific HASP, which mandates that all field personnel wear the appropriate personal protective equipment (PPE).

4.1 Direct Push Soil Sampling

Soil sampling will be performed using 5-foot long acetate macro-core sleeves that will be advanced continuously to the desired depth below the ground surface. Soil samples will be screened continuously using a photoionization detector (PID) for organic vapors. Organic vapor screening will be performed by puncturing holes in the acetate liners or making a small slice in the soil column with a knife or sampling tool. The PID will then be inserted to collect a headspace reading for approximately 5-10 seconds. This procedure will be repeated at intervals along the soil column at the field scientist's discretion. The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.)

Soil samples for laboratory analysis will be collected from the 6-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field scientist's judgement (field conditions may require longer than 6-inches to make a sufficient sample; however, this will be field based).

The samples will be collected by cutting the soil in two places. Soil samples for VOCs will be managed in accordance with EPA Method 5035 A – Closed System Purge-and-Trap and Extraction Procedure for Volatile Organics. A TerraCore and/or EnCore sampler will be used to collect at least 5 grams of soil and transfer carefully in laboratory provided and sealed vials. The entire sample vial will be placed, unopened, into the instrument by the laboratory to ensure minimal loss of volatile constituents.

Other samples can be collected using stainless steel or aluminum trowel, spoon or knife and homogenized (composite) in a decontaminated stainless-steel pan before placing in the sample bottles.

Samplers will wear phthalate-free gloves such as nitrile (no latex will be used). Only decontaminated, clean metal instruments will be allowed to touch the sample. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, when appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next interval depth.

4.2 Remedial Excavation Sampling Procedures

Remedial excavations will be the primary means of cleanup. Remedial excavations may extend from two to 11 feet or more and may extend below the water table. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

Soil samples collected at depths of three (3) feet or greater will be collected directly from the excavator bucket, at least 6 inches from the bucket sides to avoid cross-contamination. Samples will be collected from fresh bottom material, not from material that has washed in from the surrounding excavation.

Samples will be collected with a decontaminated sampling spoon, trowel, or TerraCore/EnCore sampler. Soil samples will be placed in stainless-steel bowl and/or Zip Lock bag and labeled with the proper sampling interval. To prevent VOC loss, VOC samples will be collected directly from the excavator bucket with a TerraCore/EnCore sampler. VOC samples will be collected from the unexposed soil approximately 6 inches into the bucket using a TerraCore/EnCore sampler ensuring minimal VOC loss from exposure. The remaining non-VOC samples will be collected from the sampling bowl or Zip Lock bag.

Removed soil will be observed and the presence and depth of stained soil, obvious chemical or petroleum odors emanating from the excavation, depth to groundwater (if encountered) and signs of a sheen on the water surface will be documented in the Field Book. Removed soils will be screened with a PID and recorded in the Field Book. The sample depth will be recorded

4.3 Monitoring Well Installation

Borings will be advanced to the desired depths by means of hollow stem augers and a truck-mounted or skid-mounted drill rig for the installation of monitoring wells. The monitoring wells will be constructed of two-inch diameter PVC in accordance with the following procedures:

- Using an oil/water interface probe, measure and record the depth to water in the open hole.
- Lower a PVC riser with a 10-foot to 15-foot length of PVC slotted screen to the bottom of the borehole. Approximately seven feet of the screen will be placed below the water table.
- If dense non-aqueous phase liquids (DNAPL) (such as tetrachloroethene) are suspected, a two-foot sump of steel casing will be attached to the bottom of the screen.

- The PVC screen slot size will be selected based on the sediment grain size observed in the soil. A slot opening of 0.020 inches will be chosen when medium to coarse sand is the dominant grain size. If silty sands or fine sand is dominant, then a 0.010-inch slot size will be chosen.
- In the annular space around the well screen, install the sand filter pack (about one to two feet above the top of the screen).
- For the one to two feet above the filter pack, a bentonite seal will be installed in the annular space.
- The remaining annular space will be filled with a bentonite-cement grout.
- Install a locking cap, flush-with-grade, curb box that has been set in cement. Set up a cement apron around the curb box to direct run-off away from the well.
- Decontaminate the hollow stem augers prior to and following each well installation
- Record data regarding the well installation in the field logbook and/or field data sheets (i.e., location, depth, construction details, water level measurements).

4.4 Groundwater Sampling

Groundwater samples will be collected from the monitoring wells applying the following procedures:

- If feasible, a headspace reading for vapor concentrations will be conducted. Prior to any sampling, remove the well plug slowly and measure the vapor concentrations within the well using a PID. In the instance a well is sealed and has dedicated through-tubing PID measurements will likely be infeasible.
- Measure depth-to-water using a water-level meter or an oil/water interface probe. For wells that do not have NAPL use a water level meter. For wells that historical had NAPL, measure depth to water using an oil/water interface probe to check for light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL). If NAPL is measurable, groundwater samples will not be collected as they are not representative.
- Connect a dedicated tubing to either a peristaltic or submersible pump and lower such that the intake of the pump is set at a mid-point of the water column within the screened interval of the well. The intake should be a minimum of 2-feet above the bottom of the well screen. Record the depth of the intake in the field notes. Connect the discharge end of the tubing to the flow-through cell of multi-

parameter (or equivalent) meter, such as a Horiba U-22. Connect the tubing to the output of the cell and place the discharge end of the tubing in a 5-gallon bucket.

- Low-flow purging and sampling will be implemented.
- Each monitoring well will be purged to ensure that a representative groundwater sample is obtained. Purge samples will be collected periodically (every 5 minutes) and analyzed for water-quality parameters (e.g., turbidity, pH, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity). Each well will be purged until the water-quality parameters stabilize (three successive readings) or three well volumes have been removed (see parameter stabilization criteria below). All purge water will be containerized in a 55-gallon drum.

Parameter	Stabilization Criteria
pH	+/- 0.1 pH units
Specific Conductance	+/- 3 % S/cm
ORP / Eh	+/- 10 mV
Turbidity	+/- 10 % NTUs (<50 NTUs)
Dissolved Oxygen	+/- 0.3 mg/L

- After purging is complete, the tubing to the flow through cell will be disconnected. The groundwater samples will be collected directly from the discharge end of the tubing into the required sample containers listed in Table 1. The containers will be labeled as described in Section 4.4.1 and stored in cooler with ice. The samples will be maintained at 4° +/- 2° C in the field and during transport.
- When the sampling is completed, the pump and tubing will be removed from the well.
- The pump, water-level meter and flow-through cell will be decontaminated as described in Section 4.5.
- All field measurements (depth-to-water, water-quality parameters), calculations (well volume) and observations will be recorded in the project logbook and on field data sheet.

4.4 Sample Handling

4.4.1 Sample Identification

All sample containers will be labeled with the following information:

- Project identification
- Sample identification

QUALITY ASSURANCE PROJECT PLAN
175 Roger Avenue, Inwood, New York
BCP# C130164

- Date and time of collection
- Analysis(es) to be performed
- Samplers initials

Collected and labeled samples will be placed in ice-filled coolers away from direct sunlight to await shipment/delivery to the laboratory. The samples will be maintained at 4° +/- 2° C in the field and during transport.

4.4.2 Sample Preservation

During the sampling day, samples collected will be preserved by placing the containers in coolers immediately after collection. At the end of the sampling day, all field samples that are to be shipped overnight will be packaged in coolers and shipped with the appropriate chain-of-custody (COC) forms. Prior to shipment each sample will be placed in a sealable plastic bag. A fresh bag of ice, or “blue ice” blocks will be placed into the cooler along with the chain of custody (COC) form. The samples may be shipped overnight (e.g., via Federal Express) or transported by a laboratory courier. Any coolers that are shipped to the laboratory will be sealed with tape and a COC seal to ensure that the coolers remain sealed during delivery.

Each of these coolers will also contain a temperature blank so that the receiving laboratory may verify sample temperature upon receipt.

Soil Samples

Soil samples will be placed in designated sample containers and EnCore samplers.

Groundwater samples collected

Groundwater samples will be collected and directly placed in laboratory prepared sample containers with appropriate preservatives. The analytical method for VOCs calls for the addition of preservatives to the vial prior to sampling. The preservative include hydrochloric acid (HCL).

4.4.2 *Sample Custody*

The field personnel will be responsible for maintaining the sample coolers in a secured area until arrival at the laboratory. Sample possession record from the time of obtainment in the field to the time of delivery to the laboratory or shipping off-site will be documented on COC forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; signatures of individuals involved in sample transfer; and the dates and times of transfers. The laboratory personnel will examine the custody seal's condition at sample check-in.

4.5 **Decontamination Procedures**

Decontamination will be performed on plastic sheeting or other containment area that is deemed to prevent runoff to the ground. Prior to use onsite and between sampling locations, pump, water-level meter and other non-disposable sampling equipment will be decontaminated using the following protocol:

1. Scrub using tap water /non-phosphate detergent mixture and bristle brush.
2. Rinse with tap water.
3. Repeat step 1 and 2.
4. Final rinse with distilled water.
5. Air-dry.

4.6 **Field Instrumentation**

All field instruments will be calibrated at the start of each day of field work in accordance with the manufacturer's specifications. In the instance that an instrument fails calibration, the Project Manager or QA/QC Officer must be contacted so as to arrange repairs or obtain a replacement instrument. A calibration log will be maintained onsite in the field book in order to record specific details regarding instrument calibration, including: dates, problems, and corrective actions. The PID will be zeroed with ambient air and calibrated with a standard of 100 parts per million (ppm) isobutylene each day, as per manufacturer specifications.

All field personnel will be trained in the proper operation of all field instruments at the start of the field program; however, instruction manuals for all equipment will be stored onsite as a reference of the proper procedures for operation, maintenance and calibration.

5.0 **DOCUMENTATION AND RECORDS**

5.1 **Documentation Standards**

This procedure will be used for all field activities regardless of purpose. These activities may include but are not limited to; all types of media (soil, soil vapor, groundwater)

sampling, GPR and all survey work, well installation, Site reconnaissance and inspection, remediation, OM&M tasks, and waste disposal and handling. The field personnel will keep an accurate written record of their daily activities in a bound field notebook sufficient to recreate the project activities without reliance on memory. All entries must be written in waterproof indelible ink. There should be no blank line. If only part of the page is used, the remainder of the page should have an “X” drawn across it.

5.2 Laboratory Data Packages

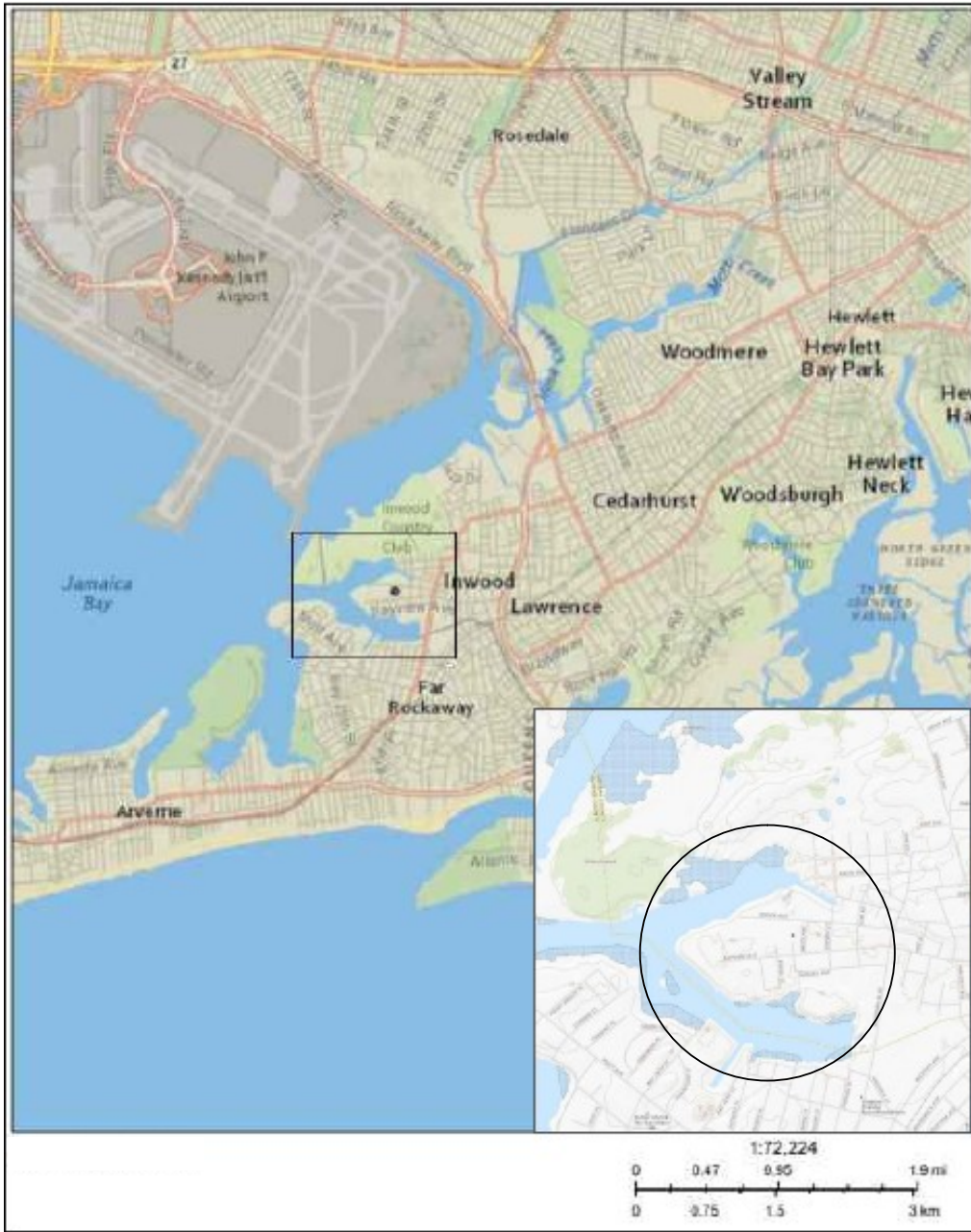
The samples collected will be sent to a NYS Environmental Laboratory Approval Program-certified laboratory for analysis and the summary data packages will be delivered in the New York State Analytical Services Protocol (NYSASP) - Category B which include the results, QC summaries, and all raw data. The full data package will contain all information required for validation.

5.3 Data Usability Summary Reports and Electronic Data Deliverable

As approved by NYSDEC, all data validation and generation of the Data Usability Summary Reports (DUSRs) will be completed by the FE in-house data validator. The purpose of the data usability review is to determine whether or not the data meets the Site-specific criteria for data quality and use. A Data Usability Summary Report (DUSR) will be prepared in accordance with NYSDEC DER-10 - Appendix 2B Guidance for Data Deliverables of Data Usability Summary Reports.

The data will be submitted to NYSDEC in an EQUIS Electronic Data Deliverable (EDD) format in accordance with Section 1.15 of NYSDEC’s May 2010 *DER-10 Technical Guidance for Site Investigation and Remediation*.

Figures



Far Rockaway & Lawrence 7.5' Quadrangles; published by the USGS, and obtained from National Map Viewer ©2020



FIGURE 1: SITE LOCATION MAP

SITE: 175 Roger Ave.
Inwood, NY, 11096

CLIENT: AJM Capital, LLC

Environmental Management & Consulting, 158 W. 29th Street, New York, NY 10001



Environmental Management & Consulting
 158 West 29th Street, 9th Fl.
 New York, NY 10001

**175 Roger Avenue
 Inwood, N, 11096**

Figure 2

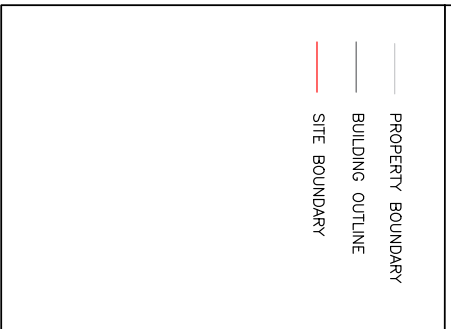
Site Plan

September 2020

**Project Number
 10188-017**

LEGEND

- PROPERTY BOUNDARY
- BUILDING OUTLINE
- SITE BOUNDARY



Tables

Table 1
Summary of Analytical Methods
175 Roger Avenue
Inwood, New York

Sample Type	Sample Matrix	Analytical Parameter	No. of Samples ¹	Analytical Method	Sample Preservation	Holding Time ²	Sample Container ³
Grab	Soil	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace	14 days to analysis	(1) 60 mL glass jar
Grab	Soil	Metals	TBD	Metals 6010D	Cool to 4° C; no headspace	NYSDEC technical requirements for hold time not established. 180 days for aqueous samples.	(1) 8 oz glass Jar
Grab	Soil	GRO	TBD	Method 8015D	Cool to 4° C; no headspace	14 days to analysis	(1) 8 oz glass Jar
Grab	Soil	TPH DRO	TBD	Method 8015D	Cool to 4° C; no headspace	14 days to analysis	(1) 8 oz glass Jar
Grab	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl, Ascorbic Acid	7 days to analysis	(3) 40mL VOA Vials
Grab	Aqueous	Metals	TBD	Metals 6010D	Cool to 4° C; Nitric Acid	180 days to analysis	(2) 500ml plastic
Grab	Aqueous	GRO	TBD	Method 8015D	Cool to 4° C; no headspace, HCl, Ascorbic Acid	14 days to analysis	(3) 40mL VOA Vials
Grab	Aqueous	TPH DRO	TBD	Method 8015D	Cool to 4° C	14 days to analysis	(1) 500ml Amber Glass
Trip Blank	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days to analysis	(2) 40mL VOA Vials
Equipment Blank	Aqueous	VOCs, TCL	TBD	SW-846 Method 8260B	Cool to 4° C; no headspace, HCl	14 days to analysis	(3) 40mL VOA Vials
Equipment Blank	Aqueous	VOCs, TCL	TBD	Metals 6010D	Cool to 4° C; Nitric Acid	180 days to analysis	(2) 500ml plastic

¹ Actual number of samples may vary depending on field conditions, sample material availability, and field observations

² From date of sample collection, based on SW-846 and consistent with NYSDEC ASP when assuming 2 days for sample shipping

TBD - To Be Determined

TCL – Target Compound List

Table 2
Summary of Quality Control Samples
175 Roger Avenue
Inwood, New York

Sample Type	Sample Matrix	Analytical Parameter	No. of QA/QC Samples
Trip Blank	Water	VOCs	1 per 20 samples
Field Duplicate	Soil, Water	VOCs; Metals	1 per 20 samples
Field Blank	Water	VOCs; Metals	1 per 20 samples

Attachment 1

Personnel Qualifications



Environmental Management & Consulting

Arnold F. Fleming, PE

Owner

Education

- Bachelor of Science, Civil Engineering, Manhattan College (1968)
- Masters of Engineering, Manhattan College (1969)

Professional Registration

Professional Engineer, New York

General Expertise

Arnold F. Fleming is an environmental engineer with over 30 years of experience in the areas of water quality and planning studies, domestic and industrial wastewater treatment and disposal, environmental impact analysis, contaminated materials assessment and remediation, and environmental permitting. Mr. Fleming was one of the founders of Allee King Rosen & Fleming, Inc., AKRF, Inc., and AKRF Engineering P.C. For over 20 years, Mr. Fleming has provided these firms with engineering expertise in all technical areas relating to permitting and hazardous waste assessment and management and the assessment of impacts in these technical areas. Mr. Fleming has been Principal in charge for Phase II Environmental Assessments for over 100 residential, commercial and industrial sites in the Metropolitan New York area. Duties include design of sampling program, oversight of means and methods of sample collection, and preparation of final reports including recommendations for remediation. He has also been involved with the design for over 50 remediation systems including UST tank removals, contaminated soil disposal, soil vapor extraction systems, sparged air/ soil vapor extraction systems. Remedial designs include approximately 20 sites remediated under the State of New York Voluntary Clean-up program, and two sites on the Registry of Inactive Hazardous Waste Sites. Mr. Fleming has been the Principal in charge of the preparation of Phase I Environmental Assessments for several hundred residential, commercial and industrial properties, as well as several hospitals throughout the New York Metropolitan Area. He has been the Project manager for the preparation of 208 wastewater facility planning studies, and has prepared the infrastructure and utility assessments for over 100 EIS's in the Metropolitan New York Area.

PROJECT EXPERIENCE

535 West 23rd Street Development

Prepared the Phase I and asbestos surveys for this Manhattan development site. Designed the Phase II sampling program, executed the sampling and on the basis of the findings obtained approval to remediate an extensive oil spill via bio-remediation. The system was designed and installed under the new building with operation to begin upon occupancy of the building. The approach allowed the construction schedule to proceed without delay due to the discovered contamination.

Fleming-Lee Shue, Inc.

Queens West Redevelopment

Technical representative to the Queens West Development Corporation (QWDC) a subsidiary to the Empire State Development Corporation charged with developing the 78 area redevelopment of the Hunters Point waterfront into a mixed commercial/residential development. Mr. Fleming developed a model remediation plan for the first residential building in 1995 and has applied this model to the next three residential development sites in Stage 1 of the development, the first having opened for residency in the summer of 2002. Mr. Fleming is assisting QWDC in selecting a developer for Stage 2 and 4 and is advising them on the remediation of Stage 2, a former oil refinery and paint factories. Development of Stage 2 is to occur simultaneous to the remediation efforts in the refinery portion of the site.

Staten Island Muss Site Redevelopment

Managed the initial Phase II sampling for this former industrial site re-zoned for single family residential development. The site was listed on the Registry of Inactive Hazardous Waste Sites. Prepared Remedial Investigation and Feasibility Study that led to a Record of Decision (ROD) setting forth the remediation for the site. Prepared the remedial Design to satisfy the ROD and managed the oversight of the remediation leading up to the removal of the site from the registry. Designed a revetment system to protect the capping material that was an integral part of the remediation from storm related erosion from the adjacent Raritan Bay. Petitioned the Federal Emergency Management Agency to remove the site from the 100-year flood plain on the basis of the new elevations and erosion measures implemented on the site.

Rego Park, Queens Remediation

Prepared a Voluntary Clean-up Application, performed additional sampling and developed a remedial work plan to remove solvent contaminated soils from this development site. Designed a sparged air/ Vapor Extraction System to remediate contaminated groundwater and site soils. Operated the system for two years reducing the groundwater contamination by over 90%. The sparged air / VES was designed to be installed under the building avoiding the delay of remediation the site prior to construction.

Hudson River Park Redevelopment

For this new park stretching from Battery Park City to 59th Street, Mr. Fleming oversaw the preparation of the US Army Corps of Engineers and the New York State Department of Environmental Conservation permit applications and responses to comments leading to issuance of this waterfront development permit. This permit was unique in that it addressed the first segment that was designed and ready to be built as well as the entire park for which no design was available. To address the future segments, schematic design drawings were submitted showing conceptual designs that would be refined as the park was designed and built. A permit condition to submit each segment design for review and determination of consistency with the master permit was included to assure that no impacts were introduced in the design process. If a determination on any segment were made that the design was not consistent with the master permit, a new permit process would be initiated.

Fleming-Lee Shue, Inc.

Greenpoint Brooklyn Waterfront Development Planning

For a private developer, Mr. Fleming has prepared an evaluation of the permitting concerns including a jurisdictional assessment of the existing waterfront edge, to assist in the establishing of a development plan that will be compatible with the requirements of federal and state permits.

Queens West Redevelopment

Mr. Fleming led the permitting effort to allow redevelopment of the waters edge associated with this 78 acre mixed Commercial/Residential waterfront development. The project has three stages, the first under construction and permitted in 1995. Mr. Fleming managed the permitting effort for this first waterfront permit. The current application to the state and federal permitting agencies is for a project wide permit covering the remaining 3 stages of which 2 are under design. The final stage of the project was the subject to a schematic design only. Notable in the current permit is the reconstruction of collapsed platforms that are to become a site wide park and esplanade providing water access to this portion of the east river for the first time in over a century.

West Side Ferry Terminal

For the New York City Economic Development Corporation, Mr. Fleming led the permit effort to allow a new public ferry terminal located within the bounds of the Hudson River Park. Because the ferry terminal was not approved when the Park permit was issued, this project was carved out of the park permitting process and followed a separate permit track. The permit application was assembled using updated submissions from the Park permit application and addressed the specific concerns of the State and federal permitting

Jersey City Colgate Site Redevelopment

For this mixed commercial/residential waterfront redevelopment project, Mr. Fleming prepared the state Coastal Zone Development permit and a US army Corp of Engineers dredge and fill permit to allow a marina, esplanade and a new combined sewer manifold to be built. The sewer manifold was placed in the river because of space limitations and was permitted, the first fill permit in this portion of the Hudson River in 20 years.

River East Environmental Permits for Shoreline Protection

For this 10 acre site obtained the permits to install 500 feet of revetment to allow a 1.4 million square foot residential development on a former oil terminal. Also prepared the Remedial Action Work Plan to remove historic spilled oil simultaneous to Vernon Realty shoreline construction.



Environmental Management & Consulting

Mark Hutson, PG

Associate

Education

BIS, Geological Sciences and Applied Biological Sciences, Arizona State University, Tempe, AZ

Certifications and Training

- OSHA 40-HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- OSHA 10-Hour Construction Safety
- NYCOER Gold Certified Professional
- LIRR Roadway Worker Protection Training (2019)
- DOT Hazardous Waste Manifest Training (2019)

Professional Registrations

- Professional Geologist (License No. 001190-1) – New York State

GENERAL EXPERTISE

Mark Hutson is an Associate at Fleming-Lee Shue, Inc. with extensive experience in environmental consulting. Mark provides clients with innovative, cost effective strategies to manage their environmental liability and compliance issues. He oversees the firm's project portfolio as well as managing junior and senior level staff. His expertise include hazardous material assessments, environmental due diligence, site characterization, sub-surface investigations, soil and ground water remediation, remedial design and implementation, data management and interpretation, regulatory compliance and reporting, stakeholder management, cost to incident closure estimates and insurance claim investigations. He has considerable leadership and supervisory experience. Mark has worked on environmental projects in New York, New Jersey, Connecticut, Arizona, California and Nevada.

PROJECT EXPERIENCE

Queens Plaza Residential Development (QPRD), Long Island City, NY

Served as project manager for three separate Brownfield Cleanup Program sites associated with QPRD. Responsibilities included direct oversight and management of day to day field activities, implementation and execution of the remedial program, coordination with construction managers, remedial contractors and several local and state agencies including NYSDEC, NYCOER, NYSDOH, and NYCTA. Remediation included the removal of over 115,000 tons of impacted soil, In-situ Soil Stabilization, NAPL recovery, collection of over

Fleming-Lee Shue, Inc.

400 soil samples. Mr. Hutson's authority included directing all field efforts and acted as the primary contact for the project. Additional responsibilities included the coordination and preparation of all final reports including SMPs and FERs. QPRD received Certificates of Completion (COCs) for all three sites in August and September of 2016.

Inwood Rezoning, Manhattan, New York

Assessed presence of hazardous materials in soil and groundwater at projected and potential development sites identified in the Inwood Rezoning proposal over a 27-block area of Inwood neighborhoods in the Manhattan Borough of New York City. Composed the hazardous materials chapter of the Environmental Impact Statement and coordinated with NYC Economic Development Corporation to address revisions and comments.

Port Richmond Brownfield Opportunity Area Study, Staten Island, NY

Developed an inventory of and analysis of known and potential Brownfield Sites within the project boundaries. Prepared an environmental assessment including a review of past site use and potential for environmental impact for six strategic sites proposed for potential redevelopment. Assisted in the preparation of the Nomination Document pursuant to NYS Department of State (NYSDOS) guidelines and coordinated with NYSDOS to address revisions and comments.

Penn Station Access Project, NYC Metro Area

Evaluated the potential of hazardous materials in soil and/or groundwater throughout the proposed construction corridor for the Penn Station Access Project (approximately 15 miles) through a comprehensive review of historical property information as well as conducting site reconnaissance for properties of concern. Oversaw the preparation of the Hazardous Materials chapter included in the final Environmental Assessment Statement prepare for the Metropolitan Transit Authority.

Retail Petroleum/Bulk Storage Facilities Portfolio, New York

Served as project manager for numerous active and former retail petroleum facilities in varying lifecycle stages including site characterization, remedial design and implementation, and closure for a major petroleum client. Responsibilities included site characterization, scope development, remedial design and implementation, data management and interpretation, UST/AST removal, budget forecasting and management, regulatory compliance and reporting, and management of project teams and subcontractors.

Insurance Claim Investigation and Support, NY/NJ

Served as the regional lead and project manager for an international insurance company acting as environmental expert to assist the insurer in claim determinations. Responsibilities included claim investigation and technical support on projects associated with petroleum and industrial chemical releases, remediation, and UST removals in New York and New Jersey. Responsible for developing cost to incident closure estimates, determining what is reasonable and necessary regarding an insured's response to a claim, preparation of claim recommendations and reports including reviewing insured's invoices and invoice tracking.

Fleming-Lee Shue, Inc.

Former Retail Petroleum Facility Redevelopment, Brooklyn, NY

Served as project manager for the remediation and redevelopment of a former retail petroleum facility with an open NYSDEC spill number. Remediation of the underlying soil and groundwater occurred simultaneously with the construction of a 12-story multi-use building. Remediation included the excavation of contaminated soil to 15 feet bgs followed by In Situ Chemical Oxidation of residual soil and ground water impacts. Project required interface with and coordination of numerous stakeholders and regulatory agencies including the NYSDEC, NYCOER, NYCDEP, NYCTA and NYCDOB.

Soil Vapor Intrusion Investigation, Brooklyn, NY

Served as project manager for a large soil vapor intrusion investigation of a former retail petroleum facility now a PETCO retail store. Responsible for the development and execution of a sampling plan in compliance with NYSDOH/EPA guidelines which included the installation of numerous subsurface soil vapor sampling points and indoor/outdoor sampling of ambient air conditions to determine potential exposure scenarios.

Commingled Plume Investigation/Remediation, Blythe, CA

Acted as field geologist/environmental scientist for a public municipality client responsible for a commingled gasoline/diesel plume emanating from multiple sources. Responsibilities included plume characterization, site investigation, remedial design, implementation and operation, permitting, data collection and analysis, and waste management. Oversaw the installation of five multi-phase extraction (MPE) systems and was responsible for the operation, maintenance and optimization of the MPE systems operating simultaneously.

Various Environmental Sites, AZ/CA/NV

Served as lead environmental scientist/field geologist for numerous environmental remediation sites throughout Arizona, Southern California and Nevada. Responsibilities included site characterization, sub-surface investigations, sampling of environmental media, data analysis and interpretation report preparation, and oversight of remedial contractors.



Environmental Management & Consulting

Steven E. Panter, CGWP, PG

Education

- GIS Training, Penn State University, ongoing
- Master of Science, Environmental Engineering, Concentration in Hydrogeology New Jersey Institute of Technology (1990)
- Graduate Studies, Soil Sciences, Rutgers University (1979)
- Bachelor of Science, Forest Science, University of Wisconsin (1978)

Certifications/Training

- OSHA 40-Hour HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- Fracture Trace and Lineament Analysis, April 1995
- Intensive training course in identifying fractures and lineaments in rocks of Pennsylvania.
- The course emphasized the importance of identifying these features in order to assess and understand ground water movement and to understand contaminant migration in geologic settings where these features can play a key role.
- Treatment Technology for Contaminated Soils and Ground Water, February 1995.
- Assessment, Control and Remediation of LNAPL Contaminated Sites, October 1994.
- Ground Water Flow through Fractured Media, University of Wisconsin, 1993.
- Hydrogeology of the Glacial Deposits of New Jersey: An Applied Field Course, presented by Cook College in Cooperation with Rutgers University, 1993.
- Design and Analysis of Aquifer Pumping Tests - Association of Ground Water Scientists and Engineers, Dublin, Ohio, 1991.

Professional Registrations

- Certified Ground Water Professional (CGWP No. 437) by the National Ground Water Association (NGWA), June 1993
- Professional Geologist – New York State

General Expertise

Steven Panter is a Hydrogeologist with over 30 years of experience in environmental consulting. Mr. Panter has supervised or played a key technical role in many soil and ground water investigations involving investigations and remediation of fuel oil, PCE, TCE, polychlorinated biphenyls (PCBs), cumene, gasoline, organic compounds, metals, dioxins, and coal tar. They have been performed for landfills, chemical processing plants, underground storage tanks (UST), fuel oil terminals, manufacturing plants and power production facilities. The clients have been primarily large corporations, utilities, or municipalities, although some work has been done for small businesses. He is responsible for projects that range from less than \$20K to more than \$20,000,000. Mr. Panter has developed sampling and analysis programs for a variety of ground water and

Fleming-Lee Shue, Inc.

subsurface soil investigations. His expertise also extends to technical oversight and legal support; and environmental auditing. Mr. Panter also has worked on environmental impact statements for several proposed power plant facilities and power plant upgrades in New York State.

He has extensive experience in New York State Brownfield Cleanup Program projects. Mr. Panter has directed or played a key technical role in a number of Brownfield projects involving the investigation and remediation of petroleum and coal tar contaminated media.

PROJECT EXPERIENCE

Queens Plaza Residential Development

Mr. Panter was one of the key senior staff and the technical lead for the Brownfield remediation of a highly contaminated three-acre, parcel in New York City. The total project monetary size was 875 million dollars. The former chemical plant was incorporated into three separate Brownfield sites that required multiple investigations, remedial investigation reports, and remedial action work plans. Mr. Panter was the principal author of these reports and responsible for meeting deadlines to ensure that financing for the project remained in place. He coordinated major aspects of the project and represented the client in meetings with state officials, attorneys, insurance companies and other critical parties. Ultimately, the site successfully met the Brownfield goals and received Certificates of Completion (COC) for all three parcels allowing development to move forward. Very large tax credits then became available to the client as a result of receiving the COCs.

Queens West Parcel 8 Remediation

Mr. Panter oversaw and directed the investigation of a Brownfield Cleanup Program site contaminated with 80,000 pounds of coal tar waste. He developed an innovative *in situ* remediation approach, RemMetrik[®], which eliminated excavation and saved the client \$7 to \$9 million dollars in cleanup costs and eliminated community exposure. The treatment focused on oxidation of 47,000 pounds of coal tar contaminant in the treatment interval. This was the first remediation of its kind in New York State. NYSDEC approved the results and issued a Certificate of Completion within 14 months of the beginning of cleanup. Treatment lasted five months in one application.

Queens West Center Boulevard Remediation

Mr. Panter oversaw and directed the investigation of a Voluntary Cleanup Site contaminated with 18,500 pounds of coal tar waste. He developed an innovative *in situ* remediation approach, RemMetrik[®], which eliminated excavation of the street and disruption to the community and eliminated public exposure. This was the second remediation of its kind in New York State. NYSDEC review is ongoing. Treatment lasted two months in one application.

Queens West Redevelopment

Mr. Panter oversees environmental compliance for a very large scale redevelopment of the New York City waterfront, and entails remediation of numerous parcels of former

Fleming-Lee Shue, Inc.

industrial waterfront that are heavily contaminated with petroleum, coal tar, and numerous other wastes. The site will be redeveloped into commercial and residential space with parks and green spaces. Mr. Panter advises QWDC on all aspects of environmental compliance, contaminated site investigation, hazardous materials management, and remediation.

Long Island City, Queens, New York Redevelopment

Mr. Panter prepared a detailed assessment of soil disposal options and costs for a facility contaminated with creosote and metals. He used a statistical analysis approach to advise the client on the most cost effective means of selecting soil disposal options depending on the type and degree of soil contamination.

West 23rd Street 10th Avenue Redevelopment

On a site contaminated with gasoline and fuel oil, Mr. Panter prepared an analysis differentiating the sources of on-site and off-site contamination in order to justify closing the spill number. This was a multivariate analysis demonstrating that the on-site contamination was clearly different from the off-site contamination. What was unique about the analysis is that conventional reporting of results did not distinguish between the different sources, but the multivariate analysis—using the same data—showed a distinct difference.

West 30th Street and 11th Avenue Redevelopment

On a site contaminated with metals near a former coal gas plant slated for a major residential development, Mr. Panter analyzed groundwater issues stemming from benzene contamination and successfully predicted contaminant plume behavior during dewatering. He developed an indoor air monitoring program for a neighboring residential building as a protective measure against inducing contamination to residents. He also presented data supporting the case that chromium levels were the result of natural conditions rather than contamination.

Gansevoort Street to West 23rd Street; The High Line

Mr. Panter managed the waste characterization portion of the High Line project in New York City, where a defunct elevated industrial railway is being converted into a major urban park and green space. Mr. Panter directed testing, removal, and management of contaminated track ballast and was a key individual in planning waste management for all track bed materials. He was responsible for directing and planning inspections for hazardous materials throughout the entire program and also directed air sampling and monitoring for the construction phase.

Astoria, Queens, NY Astoria Gas Turbines Well Reconnaissance Program

Mr. Panter managed a well reconnaissance program at the Astoria Gas Turbine facility to assist the development of a remediation program to close out petroleum spills inherited from the previous site owner. The program encompassed evaluation of more than 70 monitoring wells, groundwater and product level measurements, groundwater sampling, a summary of the findings, and recommendations for improving the monitoring network and resolving ambiguities in the well information. Mr. Panter effectively coordinated meetings between station representatives, off-site NRG managers, and an independent project manager working for NRG. He also facilitated very productive meetings between

Fleming-Lee Shue, Inc.

the previous site owner and NRG in order to obtain additional well information and secure permission to access wells in off-site, adjacent areas.

Staten Island, NRG Arthur Kill Generating Station, Staten Island Ignition Oil Area Recovery Program

Mr. Panter has been assisting NRG at the Arthur Kill Generating Station with a product recovery/monitoring in the Ignition Oil Area. This effort entails monthly monitoring, recovery, and reporting of product levels in five recovery wells installed by a consulting firm when the plant belonged to Con Edison. At NRG's request, the program was recently extended. Station personnel often call the Mr. Panter to discuss other environmental matters because of his extensive site knowledge and excellent rapport with the Station managers and staff.

Staten Island, Transformer Explosion Remediation Program

Following a transformer fire and rupture that released PCBs in concentrations exceeding 300,000 ppm, Mr. Panter managed a major remediation program encompassing massive interior and exterior portions of the power plant including soils, pavement, and walls. This was done under a Consent Order and had potential penalties of \$500,000,000. Mr. Panter oversaw and directed all aspects of the field program and represented Con Edison at numerous meetings with regulatory personnel. This portion of the remedial program lasted one year.

Staten Island, Property Sale Site Assessment

Project manager for a large-scale expedited site assessment of the Arthur Kill Generating Station as part of the property sale to Visy Paper Company and the New York City Economic Development Corporation. Directed, planned, and coordinated the investigation. Played a critical role in numerous meetings with representatives of the New York State Department of Environmental Conservation (NYSDEC) from the Acting Regional Director and Director of Hazardous Waste to NYSDEC field staff. Rapidly and thoroughly completed the site investigation and remedial assessment to a level whereby the findings and recommendations were easily accepted by NYSDEC. Acceptance of results and remedial strategies was facilitated by the excellent rapport with NYSDEC representatives.

All Boroughs, Site Investigation, New York City Housing Authority

Supervised and coordinated the investigation of 20 housing project sites with leaking USTs and pipelines for the New York City Housing Authority. Provided client contact, prepared work plans, supervised field programs, interpreted and analyzed data, and prepared final reports and recommendations. The focus of the program was to characterize and delineate the extent of oil-contaminated soils and ground water contamination, prior to remediation. Program included installation of monitoring wells and interpretation of soil and ground water contamination in a variety of geologic settings throughout the five boroughs including marine deposits, bedrock, glacial outwash and till.

Manhattan and Brooklyn, Environmental Assessment, New York City School Construction Authority

Project Manager for an environmental assessment of three properties proposed for an elementary and two middle schools in New York City. Directed technical and

Fleming-Lee Shue, Inc.

administrative aspects of the project. Program consisted of installation of deep monitoring wells in glacial outwash deposits and evaluation of ground water flow and quality.

Environmental Assessment, New York City Economic Development Corporation.

Managed environmental assessments of two NYC-owned properties slated for commercial development. Directed technical aspects of the project including soil gas testing and monitoring well installation and sampling.

All Boroughs, Site Investigations, New York City Housing Authority

Supervised the investigation of 20 sites with leaking USTs for the New York City Housing Authority.

Fuel Oil Terminal Demolition, Paragon Cable Company/Rucci Oil Company

Oversaw the demolition of two fuel oil terminals in NYC. Prepared a remedial action and sampling plan to expedite the cleanup process and comply with New York State Department of Environmental Conservation regulations. Supervised and directed the activities of several contractors with field crews of 10 to 20 people. Advised corporate principals on project progress, issues and alternatives. Met with regulatory officials on behalf of the client. One facility contained more than 18 large aboveground and underground fuel oil tanks. Total storage capacity was 2.3 million gallons. The second facility had seven underground storage tanks and one aboveground tank. Total storage capacity was 385,000 gallons.

Rockaway (NJ) Borough Superfund Site Ground Water Investigation Program

Developed a ground water investigation program for a buried glacial aquifer system in northern New Jersey. Designed the investigation to examine the effect of TCE contamination on a local aquifer. The program consisted of a network of shallow, deep and intermediate level monitoring wells and associated ground water sampling.

All Boroughs, Ground Water and Soil Sampling, New York City Housing Authority

Developed a ground water and soils sampling program to assess fuel oil contamination at approximately 20 New York City Housing Authority sites.

Site Investigation, New York City School Construction Authority

Conducted site investigations of soils and ground water in Manhattan and Brooklyn.

Soil Sampling Program, Paragon Cable/Rucci Oil Company

Conducted a soil sampling program as part of the demolition of two fuel oil terminals in NYC. The program included the sampling of waste soil piles and the excavations.

Expert Witness Testimony and Report Preparation

Mr. Panter testified as an expert witness as part of a technical panel before the New York State Board of Public Utilities as part of a power plant siting hearing. In this capacity, Mr. Panter was cross-examined on his written testimony by a panel of attorney's on the side of the opposition. He testified on technical matters involving hazardous materials and contamination of soil and groundwater and the impacts to the community depending on the project. Mr. Panter also served as a fact expert for a New York State agency in a

Fleming-Lee Shue, Inc.

contamination lawsuit against a Fortune 100 company. Mr. Panter was deposed as part of this case. He drafted and corroborated on two expert reports prepared and prepared counter arguments for the case. The case had a successful outcome for the client.

Publications

Mr. Panter has authored numerous technical papers on site investigation and remediation and has given technical presentations on these topics and on effective presentation of technical information.



Environmental Management & Consulting

Joel Kane

Project Manager/Environmental Scientist

Education

- B.S. Biology, minors in Chemistry; English, Gonzaga University (2013)

Certifications and Training

- OSHA 40-Hour HAZWOPER Training
- 10-Hour Construction Safety and Health Training
- SWPPP Inspector/Administrator
- Optical Gas Thermographer
- 8-Hour NORM Surveyor

General Expertise

Joel Kane is an Environmental Scientist with Fleming Lee-Shue, Inc. Mr. Kane has been involved with remedial investigations, monitoring & sampling and the design, set-up and maintenance of various remedial systems. Mr. Kane possesses over four years' experience in assessing the presence of hazardous materials through the evaluation of site conditions and developing remedial alternatives. He is experienced conducting Phase I and Phase II Environmental Site Assessments to support property transactions, pre-design investigations, hazardous soil and waste classification, construction oversight and lab coordination. Mr. Kane has conducted numerous subsurface investigations and is accomplished in sample collection of all environmental media. Mr. Kane has experience in large parcel Oil & Gas site remediation and reclamation, contractor oversight, major oil spill response, in addition to developing long term compliance programs (i.e. air monitoring, NORM, etc). Mr. Kane has practical lab experience in bench chemistry, organic chemistry, GCMS analyses, soil chemistry consulting, and data validation. He maintains a proficient understanding of NYSDEC, NYCOER, NJDEP regulations and has participated in the redevelopment of various Sites in the Brownfield Cleanup Program (BCP) for NYSDEC, and the Voluntary Cleanup Program (VCP) for the NYCOER. Mr. Kane maintains a track record of excellence, regularly managing the quality assurance of subcontractors and ensuring that client scope requirements are met on every project.

PROJECT EXPERIENCE

Penn Station Access Project, NYC Metro Area

Evaluated the potential of hazardous materials in groundwater, soil and soil vapor throughout the proposed construction corridor for the Penn Station Access Project (approximately 15 miles) through a comprehensive review of historical property

Fleming-Lee Shue, Inc.

information, environmental databases entries and the site reconnaissance of key properties of concern. Prepared the Hazardous Materials chapter included in the final Environmental Assessment Statement prepared for the Metropolitan Transit Authority.

Phase I Environmental Site Assessments

Performed over 75 Phase I Environmental Site Assessments including due diligence evaluations. Past assessments vary from single home residential properties to large parcel Brownfield Cleanup Program sites. Investigated the potential impacts to the sites and used expertise to summarize any existing recognized environmental conditions based on review of historical records, environmental database listings, site inspection, and interviews with former owners.

Phase II Environmental Site Assessments

Performed over 15 Phase II Environmental Site Assessment as a part of real estate transactions. Former sites include residential, industrial, auto shops, large parcel agricultural sites, oil development sites, crude oil terminals, hydro-fracking sites, and gas plants. Performed soil, groundwater, oil sludge, and soil vapor sampling on the various sites. Evaluated analytical data and prepared Phase II assessment of onsite contamination.

Remedial Site Investigations for Spills – Manhattan, NY

Performed a Remedial Site Investigation for a petroleum spill associated with a underground storage tank in Manhattan, NY. Performed drilling oversight and conducted soil and groundwater sampling on the site. Evaluated analytical data and prepared report assessment of onsite contamination.

Brownfield Cleanup Site – Former Stapler Manufacturer, Long Island City, NY

Oversaw the implementation of CAMP, operation and maintenance on soil vapor extraction system and Electrical Resistance Heating remedial technologies implemented at site. Conducted soil, soil vapor, waste characterization and groundwater sampling investigations onsite. Developed site conceptual model including evaluating remedial alternatives and delineating contaminant plume characterization. Assisted in development and oversight of *in situ* bioremediation injection on Site. Prepared daily reports, generated data management tools, and managed inventory of generated waste onsite.

Brownfield Cleanup Site – Former Chemical Factory, Long Island City, NY

Performed drilling oversight and operation and maintenance on capture well treatment system at heavily contaminated NYS Brownfield Cleanup Site. Conducted waste characterization and groundwater sampling investigations onsite. Monitored sub-slab depressurization system functionality onsite. Prepared reports and managed inventory of generate waste onsite.

Petroleum Spill Response, Remediation and Closure – MT, ND, SD, WY

Performed over 100 petroleum release and spill response remedial investigations at oil and gas facilities. Projects include ruptured treatment equipment, oil well misting, pipeline releases, leaking UST removal, and oil truck accidents. Responsibilities include excavation oversight, sample field screening, end-point confirmation sampling, analytical interpretation, remedial alternatives analysis, report preparation, and spill closure.

Fleming-Lee Shue, Inc.

Environmental Due Diligence – Raven Oilfield Acquisition, Williston, ND

Conducted massive environmental due diligence for acquisition of an entire oil field in Northern North Dakota. Evaluated the potential for hazardous materials in groundwater, soil and soil vapor at over 200 individual oil and gas development Sites. Including comprehensive review of spill records, historical development records, and local, state and federal databases. Managed team of scientists and conducted site reconnaissance at all 200 locations and developed comprehensive report within required turnaround time (two weeks).

Former Gas Plant Remediation – Everton, WY

Served as lead chemist and scientist on remedial alternatives analyses for a former sour gas plant in western Wyoming. Organized remedial investigation, evaluated laboratory analytical data and developed alternatives analyses for reclamation of the site, including *in-situ* treatment. Responsibilities included data interpretation, chemical alternative predictive modeling, remediation oversight, contractor oversight, and final report writing.

Oil Contaminated Soil Landfarm – Bairoil, WY

Served as lead consultant on reclamation of a former landfarm contaminated waste site. Organized remedial investigation, evaluated laboratory analytical data and developed site conceptual models and remedial alternatives for reclamation of the site, including the possibility for *in-situ* treatment. Responsibilities included data interpretation, chemical alternative prediction modeling, and final report writing.

Waste Oil Injection Plants– Gillette, WY

Served as lead consultant on reclamation of a three (3) former waste oil injection plant contaminated waste sites. Organized remedial investigation, evaluated laboratory analytical data and developed site conceptual models and remedial alternatives for reclamation of the site, including the possibility for *in-situ* treatment. Responsibilities included data interpretation, chemical alternative prediction modeling, and final report writing.

Stream Infrastructure Restoration Projects– Sweet Grass County, MT

Responsible for reviewing and providing construction oversight of stream infrastructure rehabilitation projects located on the Boulder River, MT. Project objectives include completing a geomorphologic and hydrologic analysis of the river near the headgate location to improve diversion efficiency to the headgate and minimize impacts to the stream and fisheries. Responsibilities included preparing a grant application, project management, and construction oversight.

Baseline Water Quality Sampling— Bakken Oil Field, ND

Responsible for project management of groundwater sampling programs for multiple oil and gas companies simultaneously. Responsibilities included constructing database of private groundwater wells, developing a Sampling and Analysis Plan (SAP), coordinating site access and scheduling, sampling groundwater wells, and developing data summary reports.

APPENDIX I
SITE MANAGEMENT FORMS

Site Inspection Form

**Site: 174 Roger Avenue, Inwood, NY
BCP Site No. C130164**

Name of Inspector _____ Weather _____ Date _____

Site personnel contacted/phone number

Is the Site limited to Restricted Residential, Commercial, or Industrial Use only? _____

Has the Site use changed since the last certification? _____

If Yes, explain how:

What is the condition of the Composite Cover? _____ good _____ fair _____ poor

Are there cracks, clogs, or loose connections in the sub-slab depressurization system pipes? _____

Differential pressure gauge reading (w.c.): _____

Is the sub-slab depressurization system operating properly? _____

If No, explain why and what corrective actions should be taken:

Attach additional sheets as needed _____

Signature of Inspector and Date

**175 Roger Avenue
BCP Site C130164
SMP- Appendix I- Site Management Forms**

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.

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

<p>CERTIFICATION BY CONTRACTOR</p> <p>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.</p> <p>_____</p> <p style="text-align: center;">Date Contractor</p>

APPENDIX J
FIELD SAMPLING PLAN

175 Roger Avenue

NASSAU COUNTY

INWOOD, NEW YORK

FIELD SAMPLING PLAN

NYSDEC Site Number: C130164

USEPA ID # NYD002059202

Prepared for:

Inwood 175, LLC & AJM Capital II, LLC
Great Neck, New York 11023

Prepared by:

Fleming, Lee Shue Environmental Engineering and Geology, D.P.C.

158 West 29th Street
New York, New York 10001

[\(212\) 675-3225](tel:(212)675-3225)

Contacts

Project name:	175 Roger Avenue	Project Manager:	Steven E. Panter, P.G. CGWP
Site Address:	175 Roger Avenue Inwood, NY 11096	Project Quality Assurance/Quality Control Officer	Mark Hutson, P.G.
Remedial Engineer:	Arnold Fleming, P.E.	Field Team Leaders/Health and Safety Officers:	Jordan Arey, GIT Ben Hess, EIT

Introduction

These standard operating procedures (SOPs) provide guidelines regarding water level gauging, groundwater sampling, ambient and indoor air sampling and sub-slab vapor sampling for the 175 Roger Avenue Site (the Site). The Site is located at the southwest corner of Gates Avenue and Roger Avenue in Inwood, New York.

Background

Historically, the Site was developed with a 155,000 square foot, one-story, warehouse building and a 2-story warehouse and office, which were constructed in several stages from 1954 to approximately 1967. The Site operated as a “Sheet Metal Fabrication” factory since at least 1961. Rockaway Metal Products occupied the Site from approximately 1971 to 1987, when they abandoned the Site and reportedly left hazardous waste material improperly stored and disposed of on-Site. In June 1992, the United States Environmental Protection Agency (USEPA) conducted a Site inspection and discovered approximately two hundred forty 55-gallon deteriorated and/or leaking drums, a 5,000-gallon tanker trailer, underground storage tanks (USTs), and observed dry wells containing sludge materials. In order to address the hazardous condition, the EPA conducted an Emergency Removal Action beginning in August 1993. The drums, tanker trailer, one (1) 1,000-gallon heating oil UST, and UST piping were removed. The Site was then used largely as a warehouse by various tenants from 1990 to 2004 including an auto repair shop (Gunter Auto Shop) and Long Island Party Rentals. The Site was acquired by Nassau County Department of Real Estate in 1995 and has remained vacant since approximately 2004. The warehouse building on Site was damaged in a fire in February 2011 and was subsequently condemned.

In 2018 the on-site warehouse building was demolished, and subsequently a Phase I ESA, remedial investigation, and remedial action were performed by FLS. In June 2022, three (3) USTs and contaminated soils were excavated from the Site. End-point and sidewall soil samples were collected and analyzed for Total Compound List Volatile Organic Compounds (TCL VOCs) and Target Analyte List (TAL) Metals. All results met Site-specific Soil Cleanup Objectives (SCOs) for Track 4 Restricted Residential use. During



and post-construction of the proposed building, a passive sub-slab depressurization system and monitoring well network will be installed.

The Site was remediated in the summer of 2022. Remediation consisted of excavating nine drywells and excavating soils from the Underground Storage Tank (UST) Area in the northern part of the Site. All endpoint samples met the Restricted Residential Soil Cleanup Objectives (RRSCOs), which are the Site's cleanup goals. The remedy also included mixing 13,025 pounds of zero valent iron in the bottom two feet of the UUST Area excavation.

Scope of Work

The Field Sampling Plan (FSP) outlines the procedures for sampling the media anticipated subsequent to the remedy that are components of the Site Management Plan (SMP). These include groundwater, indoor air, ambient air, and sub-slab vapor. The goals of groundwater and indoor/ambient/sub-slab air monitoring events are as follows:

- Sample groundwater to determine post-remedy concentrations of all contaminants of concern (VOCs) on-Site and provide a basis for examining groundwater trends over time
- Assess groundwater geochemical conditions to evaluate potential for biological degradation
- Sample indoor and sub-slab vapor to evaluate vapor encroachment of VOCs into structures

Groundwater Sampling

Equipment Checklist

Horiba U-52 Water Quality Meter or equivalent
Peristaltic Pump
¼" silicone tubing
1/16" low-density polyethylene (LDPE) tubing
Equipment cart
Marine Battery
5-gallon bucket
Nitrile gloves
Socket wrench with 9/16" head
Flathead screwdriver
Paper towel rolls
Water level meter
Photoionization Detector (PID)



Groundwater Elevations

Prior to groundwater sampling, groundwater elevations and headspace VOCs will be measured for the select wells utilizing a water level meter and PID, respectively. Begin by gently lifting the well cap and inserting the PID probe into the well casing. Record the PID reading. Then, using a water level meter, record measurements for depth to water and depth to bottom of the well from the surveyed point of the well, marked either with pen or etching.

Groundwater Sampling Procedures

Generally, samples will be collected according to the USEPA low flow sampling procedure (via peristaltic pump) for the entire monitoring well network. Based on groundwater depth measurement the well volume should be calculated and recorded. When purging via low flow the end of the sample tubing should be placed in the center of the well screen. During the purging process groundwater field parameters including pH, dissolved oxygen (DO), conductivity, oxidation-reduction potential (ORP), turbidity, total dissolved solids (TDS), salinity and temperature will be monitored and recorded using a Horiba U-52 water quality meter or equivalent. All discharged purge water will be collected in 5-gallon bucket. Once the parameters have stabilized for three rounds or at least three (3) well volumes have been purged—proceed with sample collection. Ensure during the purge and sampling process that groundwater levels do not drop more than two feet below the screen depth.

Parameter	Stabilization Criteria
pH	+/- 0.1 pH units
Temperature	+/- 3% degrees Celsius
Specific Conductance	+/- 3% S/cm
ORP/Eh	+/- 10 mV
Turbidity	+/- 10% NTUs (<50 NTUs), or if 3 consecutive turbidity values are <5 NTU
Dissolved Oxygen	10% for values greater 0.5 mg/L, or if 3 consecutive DO values are <0.5 mg/L

Indoor Air/Soil Vapor Sampling

Equipment Checklist

- Adjustable crescent wrench
- Helium detector and shroud
- ¼” silicone tubing



- 1/16" low-density polyethylene (LDPE) tubing
- SUMMA Canisters

Sampling Procedures

Indoor Air Samples

Indoor air samples will be collected subsequent to construction of the warehouse and installation of a vapor barrier and passive sub-slab depressurization system (SSD). The purpose of indoor air sampling is to evaluate whether the passive SSD needs to be converted to an active SSD. The sampling plan should be presented to NYSDEC/NYSDOH for review and comment before implementing.

Five laboratory certified 6-liter SUMMA canisters using flow controllers at 0.2 L/minute or less should be placed throughout the warehouse ground floor and samples for eight (8) hours. In addition, two SUMMA canisters should be placed in the warehouse office(s). After sampling, the SUMMA canisters will be packaged and sent to a New York State ELAP-certified laboratory under chain-of-custody for TO-15 analysis. An additional SUMMA canister should be placed in an outdoor location as a control.

It is important to ensure that the building is well ventilated for a period of time after construction is complete to remove vapors associated with building materials before indoor air sampling.

Sub-slab Soil Vapor Sampling

Sub-slab soil vapor samples are not contemplated for this Site. This is due to the very low levels of soil vapor before remediation and engineering controls installed after remediation (passive SSD). The likelihood of material soil vapors penetrating five (5) feet of imported clean fill, a vapor barrier, bypassing a passive (SSD), and eight (8) inches of new concrete slab is highly improbable. These procedures are included for completeness.

Sub-slab soil vapor samples will be collected from temporary sample locations from beneath the cover around the warehouse perimeter. There is no point in penetrating the slab and vapor barrier. An approximate 1-inch hole will be drilled through the cover at each location. A 1/8 to 1/4-inch -diameter, retractable, decontaminated, stainless steel sampling probe or other suitable sampling device will be driven to the sampling interval: one to two feet below grade. The borehole above the sampling probe will be sealed with clay and/or bentonite or equivalent material to prevent ambient air from mixing with soil vapor.

Prior to collecting a sample, FLS will employ a tracer gas test (i.e., helium) to ensure quality assurance/quality control and verify the integrity of the probe seal. Once the sampling probe passes the tracer gas test, using the same flow rate as will be used during sampling, approximately one to three purge



volumes will be purged from the sample tubing (typically ¼”-inch silicone and 1/16” polyethylene tubing). Vapor samples will be collected after the installation of the probes and tubing using laboratory certified 1- or 6-liter SUMMA canisters. Prior to and after sample collection, record ambient air temperature (degrees Celsius) and, if applicable, ambient air pressure (inches of Mercury).

While sampling, the vacuum of the sample SUMMA canister will be used to draw the soil vapor through the flow controller at 0.2 L/minute or less for eight (8) hours. After sampling, the SUMMA canisters will be packaged and sent to a New York State ELAP-certified laboratory under chain-of-custody for TO-15 analysis.

Decontamination Procedures

Decontamination will be performed on plastic sheeting or in another containment area that is deemed to prevent runoff to the ground. Prior to use on-site and between sampling locations, the water level meter, pumps, and other non-disposable sampling equipment will be decontaminated using the following protocol:

1. Scrub using tap water/non-phosphate detergent mixture and bristle brush.
2. Rinse with tap water.
3. Repeat steps 1 and 2.
4. Final rinse with distilled or deionized water.
5. Air-dry the equipment.

Sample Handling

All samples will be identified using a format that provides the essential information on the use, tracking, location, media sampled, date, time and location. All sample containers must contain the following information:

- Project Identification
- Sample Identification
- Date and time of collection
- Analysis(es) to be performed on the sample
- Samplers Initials
- Media Sampled

Collected and labeled samples will be placed in ice-filled coolers and away from direct sunlight to await shipment/delivery to the laboratory. Indoor air or soil vapor samples will not need to be preserved on ice.



To prepare the samples for shipment, place each sample in a resealable plastic bag. Then, add fresh ice in two sealable plastic bags, or “blue ice” blocks. Samples may be transported by a laboratory courier (recommended) or shipped overnight (*e.g.*, Federal Express). Samples being shipped overnight must be individually wrapped to prevent breakage. All coolers shipped to the laboratory will be sealed with packing tape and chain-of-custody (COC) seal to ensure coolers remain sealed during transport. Field personnel will be responsible for maintaining the sample coolers in a secured area until arrival at the laboratory or laboratory pick up.

Sample possession record from the time of obtainment in the field to the time of delivery to the laboratory or shipping off-site will be documented on the COC forms. The COC forms will contain the following information: project name, names of sampling personnel, sample identification, media sampled, date and time of collection, signatures of individuals involved in sample transfer, and the dates and times of transfers.

Waste Disposal

Since listed wastes (Tetrachloroethylene, Trichloroethene, Xylenes) were used on Site, a Contained-in Determination must be obtained from NYSDEC before any disposal takes place. This must be done for each waste batch, *e.g.*, groundwater purge/development water, soil cuttings, etc.

Site Map

A Site layout with the monitoring well names and locations will be provided following construction and installation of the approved monitoring wells.

Project Considerations

- Use one chain per day for samples. Lab should link chains under one lab number.
- Laboratory Turn Around Times
 - TCL VOCs, plus Stars list VOCs to be placed on Standard Turn-around-time (TAT).
 - Geochemical Analyses (sulfate, sulfide, chloride, nitrate, nitrite, methane, carbon dioxide, ferrous iron, alkalinity) to be placed on Standard TAT.
 - TO-15 to be placed on Standard TAT.
- Prepare one trip blank and one field blank per 20 samples.
- Prepare one field duplicate per 10 samples.
- Decon tools and equipment onsite.
- All decon and purge water to be contained on site and held for disposal until NYSDEC issues Contained-in Determination for each waste batch



APPENDIX K
RESPONSIBILITIES of
OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan (“SMP”) for the 175 Roger Avenue site (the “site”), number C130164, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

Inwood 175, LLC
PO Box 234800
Great Neck, NY 11023-4800
(516) 743-9113
(the “owner”).

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (“RP”) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (“NYSDEC”) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

Inwood 175, LLC & AJM Capital II, LLC
P.O. Box 234800
Great Neck, NY 11023-4800
(516) 743-9113

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner’s Responsibilities:

- 1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.
- 2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a(n) Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP’s request, in order to allow

the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

- 3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.
- 4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
- 5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3-Notifications.
- 6) If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3- Notifications and coordinate the performance of necessary corrective actions with the RP.
- 7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 8) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.
- 9) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or Occupational Safety and Health Administration (OSHA) guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the

tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

- 1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
- 2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
- 3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
- 4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
- 5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html> .
- 6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 - Notifications of the SMP.
- 7) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in Section 5 (Operation, Monitoring and Maintenance Manual) of the SMP.

- 8) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

- 9) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX L
SOIL IMPORT FORM



**NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**



Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is:

Have Ecological Resources been identified?

Is this soil originating from the site?

How many cubic yards of soil will be imported/reused?

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone?

Does it contain less than 10%, by weight, material that would pass a size 80 sieve?

Is this virgin material from a permitted mine or quarry?

Is this material recycled concrete or brick from a DEC registered processing facility?

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

Signature

Date

Print Name

Firm