127 12th Street
Interim Remedial Measures Work Plan
for
Sub-slab Depressurization System (SSDS)

127 12th Street
Brooklyn, New York
Block 1020, Lot 52
BCP Site No. C224411

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233

Prepared for:
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July 2025

CERTIFICATIONS

I, Matthew M. Carroll, certify that I am a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measures Work Plan was prepared in accordance with all applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

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

091629	July 9, 2024	Matthew M. Carroll, P.E.
NYS Professional Engineer #	Date	Signature

It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.

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AGV	NYSDOH Air Guidance Value
AOC	area of concern
AS	air sparging
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
ECL	Environmental Conservation Law
BTEX	benzene, toluene, ethylbenzene and xylenes
CAMP	Community Air Monitoring Program
C&D	construction and demolition
CDS	construction dewatering system
Class GA Standards	NYSDEC TOGS 1.1.1 Class GA Ambient Water Quality Standards and Guidance Values
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CPP	Citizen Participation Plan
COC	Certificate of Completion
DCE	dichloroethylene
DER-10	NYSDEC Division of Environmental Remediation (DER), DER-10 / Technical Guidance for Site Investigation and Remediation
DRO	diesel range organics
DOC	dissolved organic carbon
DUSR	Data Usability Summary Report
EC	engineering control
ESA	Environmental Site Assessment
EZ	exclusion zone
FB	field blanks
FER	Final Engineering Report
ft-bs	feet below building slab
ft-bg	feet below sidewalk grade
ft-msl	feet above mean sea level
HASP	Health and Safety Plan
HSA	Hollow Stem Auger
HSO	Health and Safety Officer
IC	institutional control
in-wc	inches of water column
ISCO	in-situ chemical oxidation
IRM	Interim Remedial Measure
MW	monitoring well
NGVD	National Geodetic Vertical Datum
NIOSH	National Institute for Occupational Safety and Health
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOH-ELAP	NYSDOH Environmental Laboratory Approval Program

OSHA	Occupational Safety and Health Association
PCB	polychlorinated biphenyl
PCE	perchloroethylene, aka tetrachloroethylene
PGWSCOs	6 NYCRR 375-6.8(b) – Protection of Groundwater Soil Cleanup Objectives
PID	photoionization detector
PP Metals	Priority Pollutant Metals
PPE	personal protective equipment
QA/QC	quality assurance / quality control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Plan
RCNY	Rules of the City of New York
RMO	Remedial Measure Objective
RE	Remedial Engineer
RI	Remedial Investigation
RSCOs	Recommended Soil Cleanup Objectives
RCUSCOs	6 NYCRR 375-6.8(b) – Restricted-Commercial Use Soil Cleanup Objectives
RRUSCOs	6 NYCRR 375-6.8(b) – Restricted-Residential Use Soil Cleanup Objectives
SB	soil boring
SV	soil vapor
SMP	Site Management Plan
SMMP	Soil/Material Management Plan
SSDS	sub-slab depressurization system
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TAGM 4046	NYSDEC Technical and Administrative Guidance Memorandum #4046
TB	trip blanks
TCE	trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCLP Limits	USEPA Maximum Concentrations of Contaminants for the Toxicity Characteristic
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
UUSCOs	6 NYCRR 375-6.8(a) Track 1 Unrestricted Use Soil Cleanup Objectives
VOC	volatile organic compound

INTERIM REMEDIAL MEASURES WORK PLAN

1.0 INTRODUCTION

This Interim Remedial Measures (IRM) Work Plan (WP) was prepared by Matthew M. Carroll, P.E. on behalf of Di Maio Enterprises Inc. (the Applicant) for the property located at 127 12th Street, Brooklyn, New York (the Site). The IRM WP details the proposed sub-slab depressurization system (SSDS) to be installed at the Site.

The work to be performed under this IRM WP, as well as all future remedial work, will be performed in accordance with the requirements set forth in the Brownfield Cleanup Agreement (BCA), Index No. C224411-08-24. The investigation data analyzed to-date is summarized in Section 2.0 of this Work Plan. The objective of the IRM WP is to provide mitigation of the soil vapor intrusions impacts to on-Site indoor air via an active sub-slab depressurization system.

The IRM WP will include the following scope:

1. Prior to the installation of the SSDS, a communication test will be performed to ensure that the system will create sufficient vacuum everywhere beneath the building slab and facilitate design of the SSDS prior to installation,
2. Construction of a sub-slab depressurization system (SSDS) to mitigate intrusion of chlorinated volatile organic compound (cVOC)-impacted soil vapor into the on-Site building.

The procedures and reporting requirements contained in the IRM WP are in accordance with Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 375, the NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10, May 3, 2010), the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, with May 2017 updates), and all other applicable regulatory and procedural requirements. Consistent with Sections 1.11 and 5.3(b) of DER-10, this IRM WP includes the following items:

- A Professional Engineer's certification (see page 1).
- A summary of prior environmental investigation findings and a description of the Areas of Concern identified by these investigations (see Section 2.0);
- A listing of all applicable SCGs relating to the construction of on-Site mitigation units, including inspection and professional engineer certification (see Section 3.0);
- The location and description of any temporary construction facilities or treatment units required to implement the mitigation action (see Section 4.2.3)
- A description of soil and sediment erosion control, storm water management and monitoring and dust, odor and organic vapor control and monitoring procedures to be implemented during remedial activities, if applicable (see Section 4.1.3);
- A cost estimate of the IRM action (see Section 4.2.16);
- A detailed description of the IRM action [engineering controls] and the remedial technology to be conducted for each area of concern (see Section 5.0);
- A description of institutional controls to be implemented (see Section 5.3);
- A detailed description of confirmation and documentation sampling (see Section 6.0);
- Submission of all required reports and/or documentation in electronic format (see Section 7.0);
- Submission of an Interim Site Management Plan (see Section 7.4);
- Drawings and figures, as needed, to define the elements of the IRM construction (see attached Figures);

- A schedule for implementation and reporting (see Table 3); and
- A Health and Safety Plan (HASP) that outlines the health and safety policies and procedures that govern Site investigation activities for the protection of personnel and others during the implementation of an IRM (see Appendix A);

1.1 Site Location and Description

The Site, located at 127 12th Street, Brooklyn, New York (Tax Block 1020, Lot 52), is a rectangular shaped parcel located midblock on the north side 12th Street. The Site is bound by industrial/manufacturing properties to the east and south, a parking lot and a recreational facility/NYC park to the west, and residential properties to the north. The Site is approximately 17,900 square feet (SF) and has approximately 179 feet of frontage along 12th Street. The Site is currently improved with a two-story masonry building with a cellar. The cellar level of the building does not extend fully to the western Site boundary, while the upper levels of the building fully extend to the western Site boundary.

The Site lot is zoned M2-1 denoting light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. M2-1 districts are often characterized by one- or two-story warehouses with loading bays and are often buffers between M2 or M3 districts and adjacent residential or commercial districts. Offices, hotels and most retail uses are also permitted under this zoning designation. The area surrounding the Site consists of industrial/manufacturing to the east and south, residential to the north and open space and outdoor recreation to the east.

Site location and layout are depicted on Figures 1 and 2. Figure 1 depicts the Site location; Figure 2 depicts the approximate location of building features associated with prior and current cVOC usage, hazardous waste storage and oil storage.

1.2 Description of Surrounding Property

The area surrounding the Site consists of industrial/manufacturing to the east and south, residential properties to the north, and parking and outdoor recreation to the west.

2.0 SUMMARY OF REMEDIAL INVESTIGATION FINDINGS

Limited Phase II Investigations were completed in 2023 and 2024 by Matthew Carroll, P.E. (Matthew Carroll). The following sections summarize the sampling that has been completed to-date. Previous sample locations are depicted on Figure 3.

2.1 Summary of Remedial Investigations Performed

Investigations and sampling efforts conducted at the Site are described in the following reports:

- *Phase II Investigation Report, 127 12th Street, Brooklyn, NY,* Matthew Carroll, March 2024.

Phase II Investigation Report, 127 12th Street, Brooklyn, NY, Matthew Carroll, March 2024

The objective of the 2023 Phase II Investigation was to investigate the potential presence of cVOCs or hazardous materials at the Site associated with historical and current Site operations. The objective of the 2024 Phase II Investigation was to delineate the impacts found in soil and groundwater during the 2023 investigation. Both investigations were performed to facilitate a RCRA Closure. The combined investigations were documented in a Phase II Investigation Report dated March 2024 and included the following:

- Advancement of 24 soil borings;
- Collection of 26 soil samples from 24 soil borings;
- Installation of ten permanent groundwater monitoring wells;
- Collection of eleven groundwater samples from ten groundwater monitoring wells;
- Installation of five temporary soil vapor points;
- Collection of five soil vapor samples; and,
- Collection of one ambient and one indoor air sample.

Soil results were compared to NYSDEC Unrestricted Use (UU), Protection of Groundwater (PGW) and Restricted Commercial Use Soil Cleanup Objectives (SCOs) as listed in 6 NYCRR Part 375-6.8(a) and (b), and the October 21, 2010 NYSDEC DEC Guidance Policy CP-51. UU SCOs are the most stringent cleanup standards and are used as a comparison for site-specific proposed cleanup standards. PGW SCOs are used as a screening value for potential groundwater impacts and the RCU SCOs are consistent with the current and assumed future use of the Site.

Soil sampling indicated the following:

- Tetrachloroethene (PCE) and its breakdown compounds, cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride, were detected above the UU SCOs and PGW SCOs in soil collected from the Site (and were detected above Ambient Water Quality Standards in on-Site groundwater samples). The maximum concentration of PCE in soil was 47 parts per million (ppm).
- One semi-volatile organic compound (SVOC), the polyaromatic hydrocarbon (PAH), benzo(a)pyrene, and one metal, arsenic, were detected above RCU SCOs.
- Volatile organic compounds (VOCs), pesticides and polychlorinated biphenyls (PCBs) were not detected in exceedance of RCU SCOs in any soil samples.

Groundwater results were compared to NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and Guidance Values (Class GA Standards).

Groundwater sampling indicated the following:

- PCE and its breakdown products, trichloroethene (TCE), cis-1,2-DCE and vinyl chloride were detected in one or more groundwater samples in exceedance of their respective AWQS. The maximum concentration of PCE in a permanent monitoring well was 200 parts per billion (ppb).
- One petroleum-related VOC, 1,2,4,5-tetramethylbenzene, was detected in exceedance of its AWQS in one sample.
- Several PAHs were detected slightly in exceedance of AWQS in multiple samples.
- Typical earth metals, only, were detected in filtered groundwater samples.

Sub-slab soil vapor results along with the indoor air results were compared to the New York State Department of Health (NYSDOH) Soil Vapor Decision Matrices (Decision Matrices) as outlined in the October 2006 Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (Soil Vapor Guidance), as updated through February 2024.

Sub-slab soil vapor and indoor air sampling indicated the following:

- Elevated concentrations of chlorinated VOCs (cVOCs), specifically PCE and its breakdown products, were detected in sub-slab soil vapor and indoor air samples. The maximum concentration of PCE was 16,100 ug/m^3 in sub-slab soil vapor.
- The concentrations of PCE, TCE, cis-1,2-DCE and methylene chloride result in a "mitigate" outcome when compared to the applicable NYSDOH matrices.
- A variety of petroleum-related VOCs were detected at lower concentrations, but would not require mitigation based on the applicable NYSDOH matrix.

The results of soil, groundwater, soil vapor, and indoor air samples collected during the Phase II Investigation are depicted on Figures 4A through 6B.

2.2 Contaminant Conditions

The Site is currently used for metal finishing, predominantly through spray booth painting and lacquering. Prior uses include a carpentry shop, metal manufacturer and laundry.

Based on the results of the combined Phase II Investigations, the contaminants of concern at the Site are cVOCs, specifically PCE and its breakdown products. Other contaminants detected, but that are not remedy drivers, are the petroleum VOC 1,2,4,5-tetramethylbenzene and historic fill-related polyaromatic hydrocarbons (PAHs) and arsenic. Phase II Investigation data was prepared with Category B deliverables and has been validated by a third party reviewer.

In general, the highest concentrations of cVOCs in soil were detected in shallow soils located below the building's basement in the northern portion of the Site.

CVOCs, PAHs and dissolved earth metals were detected in groundwater across the Site. 1,2,4,5-tetramethylbenzene was detected in one groundwater sample collected from the northwestern corner of the Site building.

In general, the highest concentrations of cVOCs detected in the soil vapor samples were found in the southern portion of the Site basement.

2.3 Areas of Concern

The following AOCs were identified during the 2023 and 2024 Phase II Investigations:

- Hazardous waste storage in the southeastern portion of the Site basement.
- The presence of an oil tank in the southwestern portion of the Site basement.
- Oil storage in the central portion of the Site basement.
- Degreaser and PCE storage in the southwestern portion of the first floor of the Site building.
- Lacquer storage in the northeast corner of the first floor of the Site building.
- The presence of spray booths and a vapor degreaser in the northern portion of the first floor of the Site building.

While various storage areas of hazardous waste and petroleum are noted above as AOCs, Matthew Carroll, P.E., notes that all storage areas of hazardous waste and petroleum products appeared to be in good condition and stored in accordance with all local, state, and federal laws and regulations.

2.4 Geologic Conditions

2.4.1 Topography

Based on the U.S. Geological Survey (USGS 7.5 Minute Topographic Quadrangle: Brooklyn NY) topographic map, the Site is located at an elevation of approximately 23 feet above mean sea level (msl) and is relatively flat.

2.4.2 Site Geology and Hydrogeology

Soils encountered during the Phase II Investigations included historical fill material extending from basement grade to varying depths up to 6 feet below basement grade (ft-bbg), which was the terminal boring depth. Native material underlying the fill layer was encountered at depths between approximately 3 to 5 ft-bbg with the exception of soil boring locations SB-4 and SB-11, where only fill material was observed. The fill layer included mainly fine to coarse, light to dark brown and gray sand with varying amounts of gravel and silt, and lesser/trace amounts of brick, coal, concrete, glass, and wood. Apparent underlying native material is composed primarily of fine to coarse sand, with varying amounts of clay, silt, and gravel.

Based on review of the geology surrounding the area of the Site, four geologic units (in order of increasing depth and age) lie beneath the Gowanus area of Brooklyn: 1) fill, 2) alluvial/marsh deposits, 3) glacial sands and silts, and 4) bedrock. Fill materials are associated with nearby canal construction and subsequent industrialization and regrading of the area, much of which was originally marshland. The fill consists of silts, sands and gravels mixed with ash and fragments of brick, metal, glass, concrete, wood and other debris. The alluvial/marsh deposits lie below the fill and are composed of sands (alluvial deposits from flowing water bodies), peat organic silts and clays (marsh deposits). These alluvial/marsh deposits are associated with the original wetlands complex (i.e., native sediment) that was present when the area was settled. A thick sequence of glacial deposits occurs below the alluvial/marsh deposits. These glacial sands, silts and gravel were deposited as glacial ice melted during the retreat of the last ice age. At the base of the glacial sequence lies a layer of dense clay, deposited by the glacier or prior to glaciation. Weathered and competent bedrock underlies the glacial deposits. The bedrock consists of a medium- to coarse-grained metamorphic rock known as the Fordham Gneiss (EPA, 2012).

Depth to groundwater at the Site was measured between 5.28 ft-bbg and 10.33 feet below driveway grade. Note that the driveway is pitched and that all wells will be surveyed during the Remedial Investigation. Groundwater flow has been measured to the west-northwest, toward the Gowanus Canal. A groundwater flow map based on 2024 measurements from three wells is included as Figure 7 of the RIWP.

Previous investigations at the Site documented groundwater concentrations of contaminants above the NYSDEC TOGS 1.1.1 Class GA AWQS. There are no known wellhead protection areas or specifically designated groundwater recharge areas in the vicinity of the Site. Groundwater in this area is not used as a source of potable water.

3.0 STANDARDS, CRITERIA AND GUIDANCE

The IRM will include a communication test and the installation of an active SSDS. The IRM will be implemented in accordance with the Standards, Criteria and Guidance (SCGs) detailed below.

The IRM SCGs are listed below.

SCG	Scope / Application
NYSDEC Brownfield Cleanup Program Guide (draft 2004)	General program guidance
NYSDEC CP-51 / Soil Cleanup Guidance (2010)	Restricted Use SCOs for soil
NYSDEC Division of Air Resources (DAR) Policy DAR-1	Effluent sampling
NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (2010)	Reporting, inspection and professional engineer certification
NYSDEC DER-31 Green Remediation (2011)	Green remediation components
NYSDOH Guidance for Evaluating Soil Vapor Intrusions in the State of New York (2006), as updated	Soil vapor guidance
NYSDOH Generic Community Air Monitoring Plan	Plan for monitoring dust and volatile organics resulting from construction activities
6 New York State Codes, Rules and Regulations (NYCRR) Part 360 – Solid Waste Management Facilities	Off-site disposal of waste for facilities in NYC
6 NYCRR Part 364 – Waste Transporter Permits	Transporter requirements for off-site disposal of waste
6 NYCRR Part 370 – Hazardous Waste Management System	Disposal of hazardous waste, if encountered
6 NYCRR Part 375 – Environmental Remediation Programs	General administrative guidance
6 NYCRR Part 376 – Land Disposal Restrictions	Disposal of hazardous waste, if encountered
29 Code of Federal Regulations (CFR) Part 1910.120 - Hazardous Waste Operations and Emergency Response Standard	Worker safety
29 CFR Part 1926 - Safety and Health Regulations for Construction	Worker safety
6 NYCRR 232.6 – Equipment Standards and Specifications	Worker and building occupant safety
New York City Construction Code (2022)	System materials, permitting

4.0 INTERIM REMEDIAL PROGRAM

4.1 Governing Documents

4.1.1 Site Specific Health and Safety Plan

A Site-specific HASP has been created for the Site and is included in Appendix A. All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA. A Site Contact List with names and phone numbers is included in Table 1 of the HASP and Table 1 of this Work Plan. In the event of an emergency, the Site Contact List will be used to notify Site and State agency contacts. Additionally, Table 2 of this Work Plan includes contact information for emergency services.

4.1.2 Citizen Participation Plan

The Citizen Participation Plan (CPP) enables citizens to participate more fully in decisions that affect their health, environment and social well-being. The CPP will be updated throughout the Interim Remedial Measure in response to any community feedback.

4.1.3 Community Air Monitoring Plan

The purpose of the Community Air Monitoring Plan (CAMP) is to protect downwind and building receptors (e.g., residences, businesses, schools, nearby workers, and the public) from potential airborne contaminants released as a direct result of the IRM being performed at the Site. CAMP monitoring will be required once the building slab is breached and will be implemented during all ground intrusive activities and soil handling activities. VOCs, odors, particulates and fugitive dust will be monitored during IRM work activities, in accordance with DER-10, Appendix 1A and Appendix 1B and in accordance with New York City Department of Buildings (NYCDOB) requirements and per the NYC Administrative Code, Chapter 13. Additionally, CAMP monitoring will be required to comply with special requirements for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences of facilities, per DER-10, Appendix 1A. The CAMP is included as Appendix B.

4.2 General Remedial Construction Information

4.2.1 Project Organization

An organization chart with Site contact information is included in Table 1.

4.2.2 Remedial Engineer

The Remedial Engineer (RE) for this project will be Matthew M. Carroll, P.E. The RE is a registered professional engineer (PE) licensed by the State of New York. The RE will have primary direct responsibility for implementation of the remedial program for the 127 12th Street Site (NYSDEC BCA Index No. C224411-08-24; BCP Site No. C224411). The RE will certify in the Interim Remedial Measure Construction Completion Report (IRM CCR) and Final Engineering Report (FER) that the IRM was performed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the IRM WP and any other relevant provisions of ECL 27-1419 have been achieved in conformance with the IRM WP.

The RE will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil removal, air monitoring, emergency spill response, import of back fill material (if any), and management of waste transport and disposal. A discussion of material transport off-Site has been included in Section 5.2.3 of this Work Plan.

The RE will review all pre-remedial plans submitted by contractors for compliance with this IRM WP and will certify compliance in the IRM CCR. The RE will be responsible for all appropriate communication with NYSDEC and NYSDOH.

4.2.3 IRM Construction Schedule

A general IRM schedule is included in Table 3.

4.2.4 Utility Markout and Easement Layout

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

4.2.5 Required Permits

New York City Department of Buildings requires that the SSDS riser piping be filed consistent with Chapter 5, *Exhaust Systems*, of the Mechanical Code.

4.2.6 Notification

The riser piping will be included on the riser diagram filed with the building renovation drawings. Notification regarding the start of IRM work activities will occur in accordance with DER-10, Section 1.4(c). NYSDEC and NYSDOH will be notified seven calendar days prior to mobilization for IRM implementation.

4.2.7 Site Security and Signage

All work will be within the existing Site, which has locked fences and doors. The fences and doors will be maintained throughout the IRM. Sidewalks adjacent to the Site will be maintained with barriers, as necessary during deliveries, to protect the public.

4.2.8 Deviations from the Interim Remedial Measures Work Plan

During the implementation of the IRM WP, any material deviation will be noted and immediately brought to the attention of the RE. The RE or his representative will contact the NYSDEC Project Manager and determine if the deviation necessitates a formal IRM modification and NYSDEC approval. If no formal IRM modification is required, the deviation will be noted in the Site reports and explained in the IRM CCR.

4.2.9 Work Hours

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

4.2.10 Traffic Control

A truck route to and from the Site from the nearest major highway will be selected considering:

- Limited transport through residential areas;
- Use of defined truck routes;
- Limiting the total distance to the major thoroughfares; and
- Safety in access to highways.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during implementation of the IRM; trucks exiting the Site will be securely covered, if applicable. Off-Site queuing of trucks will be prohibited, and trucks will be prohibited from stopping and idling in the neighborhood outside the project Site. The truck route map is shown as Figure 12.

4.2.11 Soil/Materials Management Plan

Minimal soil spoils are expected to be generated as a result of this IRM. As such, a Soils/Materials Management Plan (SMMP) will not be required. All generated material will be handled as investigation-derived waste (IDW). The estimated quantity of soil spoils generated during the IRM is 8 CY. Soil spoils will be contained in 55-gallon drums prior to off-Site disposal. All transport and disposal of materials will be performed in accordance with appropriate local, State, and Federal regulations including 6 NYCRR Part 364. All IDW will be sampled for waste characterization prior to off-Site disposal. All wastes generated as part of IRM activities will be handled and disposed of as listed hazardous wastes unless the facility received a contained-in-determination (CID) from the NYSDEC's Central Office to dispose of any of the waste as non-hazardous. The request for a contained-in-determination will include, at a minimum, a complete laboratory analytical data report, the identity of the material being sampled and the sample location.

The Site has been assigned EPA Site ID #NYD987029535 for the off-site disposal of hazardous waste. If a CID is not issued, all IDW associated with IRM activities will be handled as listed hazardous waste (likely F003 or F005) and additional testing will be performed to meet requirements of the disposal facilities. No material reuse will occur on-Site as part of the IRM.

Samples will be collected from the soil and tested in a manner that is consistent with disposal facility requirements, which generally require the following:

- Total petroleum hydrocarbons (TPH) by gas chromatograph/photoionization device (GC/PID);
- Total VOCs via USEPA Method 8260C;
- Total SVOCs via USEPA Method 8270D;
- TAL Metals via USEPA Method 6010B/7470A;
- Total PCBs via USEPA Method 8082;
- Pesticides via USEPA Method 8081A;

- Paint Filter via USEPA Method 9095B;
- RCRA Characteristics:
  - Ignitability via USEPA Method 1030;
  - Corrosivity (pH) by USEPA Method 1110A;
  - Reactivity; and,
- Toxicity Characteristic Leachate Procedure (TCLP) Metals via USEPA Method 1311.

Depending on the selected facility, additional analyses may be required. Characterization samples will be submitted to an ELAP-approved laboratory (also holding accreditation for the disposal facility state) for analysis. Analytical reports will be maintained, and copies will be available for inspection in the field and will be included in the CCR.

4.2.11.1 Import of Backfill from Off-Site Sources

Import of off-Site material is anticipated for backfill within the SSDS pit locations. Imported materials will be in compliance with: (1) 6 NYCRR Part 375-6.7(d) and (2) all Federal, State and local rules and regulations for handling and transport of material.

The following presents the requirements for imported fill materials to be used below the existing foundation slab. The backfill quality objectives will be the lower of the Protection of Groundwater or Unrestricted Use SCOs.

A process will be established to evaluate sources of backfill to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYSDEC.

All materials received for import to the Site will be approved by the Remedial Engineer (RE) and NYSDEC PM and will be in compliance with applicable City, State and Federal laws and requirements. The source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill was placed will be reported to NYSDEC and NYSDOH at the end of IRM activities.

4.2.11.2 Source Screening and Testing

Inspection of imported material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;

- The PE/QEP is responsible for ensuring that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite and discrete samples of imported material will be taken consistent with Table 5.4(e)10 of DER-10. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements, is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

RCA will be imported from facilities permitted or registered by NYSDEC. Facilities will be reported to NYSDEC prior to their importation to the Site. The RE is responsible to ensure that the facility is compliant with 6 NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete.

4.2.11.3 Materials Transport Off-Site

A minimal amount of soil/fill may be excavated during the installation of the piping and the construction of SSDS pits. The material will be drummed and staged for disposal as IDW. Stockpiling of soil will not take place during this IRM. Disposal destination will be determined via waste disposal sampling (see Section 5.2.2). All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364.

All equipment utilized to load drums with soil/fill will be decontaminated before and after loading with Alconox and water. Decontamination procedures will take place in a temporary containment area located in the cellar. The decontamination will contain a metal drill water box [diverter box], or equivalent, will be water tight and pitched in a way for water to accumulate and be evacuated via a sump pump into five-gallon buckets or 55-gallon drums. The base and walls of the temporary containment area will be lined with double layers of 20-mil poly sheeting. Decontamination water will be sampled for disposal in accordance with standard disposal facility requirements. Following issuance of approval by the disposal facility, a liquid pump truck will be utilized to empty each of the drums or buckets and transport the liquid to the facility for off-Site disposal. Liquid waste will be handled as IDW and stored in accordance with the procedures detailed above for soil waste.

Construction loading will be through the existing paved ramp. Measures will be taken to ensure that adjacent roadways will be kept clean of project-related debris. All trucks will be washed prior to leaving the Site and truck wash waters will be collected and disposed of off-Site in an appropriate manner. Off-Site queuing of trucks will be prohibited, and trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

To document that the disposal of listed or regulated waste exported from the Site complies with applicable laws and regulations, the following documentation will be established and reported by the RE for each disposal destination used in this project:

1. A letter from the RE or Applicant to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is listed or regulated material generated at an environmental remediation Site in New York under a governmental remediation program. The letter will provide the project identity and the name and

phone number of the RE or Applicant, and will include as an attachment a summary of all chemical data for the material being transported; and
2. A letter from each disposal facility stating it is in receipt of the correspondence described above, and is approved to accept the material.

These documents will be included in the CCR. Final disposal facilities will be identified to the NYSDEC and NYSDOH PMs prior to shipping material to any facility.

4.2.12 Contingency Plan

While discovery of previously unknown areas of concern is not anticipated during implementation of this on-Site remedy, contingency remediation may be required if previously unknown areas of concern are encountered during implementation of the IRM. These areas may include underground storage tanks (USTs) and hot spots of an unknown nature. The need for additional remediation will be determined at the discretion of the RE in conjunction with NYSDEC and NYSDOH and will be completed by a qualified remedial contractor.

Contingency for Underground Storage Tanks

While discovery of unknown USTs is not anticipated, USTs encountered during IRM implementation will be decommissioned and removed in accordance with UST closure procedures prescribed in DER-10, Section 5.5.

Truck Wash

All trucks will be washed prior to leaving the Site and truck wash waters will be collected and disposed of off-Site in an appropriate manner, if and as needed based on IRM work activities or encountered Site conditions.

4.2.13 Worker Training and Monitoring

Site workers involved with hazardous waste, as determined by 40 CFR 262.11 and ECL 27-0903 or a "source area" as determined by DER-10 Section 1.3(b)70 at the Site will be required, at a minimum, to have completed safety training and medical monitoring training for site workers pursuant to 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER). HAZWOPER training completion certificates will be submitted to the RE before commencement of Site work.

4.2.14 Pre-Construction Meeting with NYSDEC

The NYSDEC project manager will be invited to attend a pre-IRM meeting at the Site with all parties involved in the remedial process prior to implementation of the IRM. See Table 3 – IRM Schedule for the approximate timing associated with a pre-construction meeting.

4.2.15 Emergency Contact Information

An emergency contact sheet indicating the phone numbers for local emergency services is included in Table 2. This list outlines emergency contact information for use by Site workers in the case of an emergency.

4.2.16 Estimated IRM Costs

The estimated cost to implement this IRM WP is approximately $130,000. Additional costs of approximately $50,000 would be incurred for reporting.

4.3 Site Preparation

4.3.1 Mobilization

The contractor will mobilize all necessary materials and equipment on Site directly prior to the initiation of any IRM activities. Material stockpile and equipment decontamination areas will be designated.

4.3.2 Equipment and Material Staging

All equipment and materials will be stored on-Site in accordance with the requirements of this IRM WP, manufacturer's recommendations, and in conformity with applicable statutes, ordinances, regulations, and rulings of the public authority having jurisdiction. Staging and storage of materials will be in areas where space permits (e.g., cellar or paved parking area). The equipment staging will primarily be within the on-Site building, and will extend to the paved parking area as needed due to space constraints indoors. The Remedial Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property. No work shall commence until Notice to Commence work is provided by the RE.

IDW will be stored in 55-gallon drums and staged on drum pads within the cellar pending testing and disposal facility approval. All drums will labeled as Regulated or Hazardous Waste and include the generator name, address, waste description, date of waste generation and EPA ID [if applicable]. No stockpiling of material will take place as part of this IRM. All staging and storage areas will be cordoned off to prevent access by building occupants, passersby, and adjacent residential properties. All staging and storage areas will be constructed and maintained in compliance with applicable laws and regulations.

A hammer drill or jackhammer will be utilized for the installation of SSDS pits and monitoring points. Water will be maintained onsite during slab penetrations and soil excavation to be utilized for reduction of particulates, as necessary. To prevent cross contamination between locations, the equipment will be decontaminated before and after each installation and/or excavation with Alconox and water. Decontamination procedures will take place in a temporary containment area located in the cellar. The decontamination will contain a metal drill water box [diverter box], or equivalent, will be water tight and pitched in a way for water to accumulate and be evacuated via a sump pump into five-gallon buckets or 55-gallon drums. The base and walls of the temporary containment area will be lined with double layers of 20-mil poly sheeting. Decontamination water will be sampled for disposal in accordance with standard disposal facility requirements. Following issuance of approval by the disposal facility, a liquid pump truck will be utilized to empty each of the drums or buckets and transport the liquid to the facility for off-Site disposal. Liquid waste will be handled as IDW and stored in accordance with the procedures detailed above for soil waste.

All work areas, waste storage, and/or disposal containers will be secured at the end of each work day.

4.3.3 Construction Loading Zone

Construction loading will be through the existing paved ramp. Measures will be taken to ensure that adjacent roadways will be kept clean of project-related debris. Section 4.2.11 of this Work Plan details the methodology and procedures for truck loading.

5.0 SUMMARY OF INTERIM REMEDIAL MEASURES

The proposed IRM consists of the following tasks:

1. Prior to the installation of the SSDS, a communication test will be performed to ensure that the system will create sufficient vacuum everywhere beneath the building slab and facilitate design of the SSDS prior to installation and,
2. Design and construction of an SSDS to mitigate intrusion of cVOC impacted soil vapor into the on-Site building.

The IRM described herein will be performed in accordance with applicable Federal, State, and city regulations. A Site-specific HASP is included as Appendix A.

The objective of the IRM WP is to provide mitigation of soil vapor intrusion impacts to on-Site indoor air via an active sub-slab depressurization system. The proposed system design layout and details for the Site system are shown on Figures 8 and 9 respectively.

5.1 IRM Action: Soil Vapor Intrusion Remedy – Communication Test

Prior to the installation of the SSDS, a communication test will be performed to ensure that the system will create sufficient vacuum everywhere beneath the building slab. Test suction points will be installed through the floor slab in multiple locations within the on-Site building. To create the test suction points, the existing slab will be saw cut and the underlying soil will be removed to a depth of at least 18 inches. The void space will be lined with geotextile fabric and a layer of ¾" clean stone aggregate (or similar material). The test suction point design and installation methodology will be the same as the permanent suction pit design and installation, as described in Section 5.2 below. The static vacuum will first be measured by applying known quantities of vacuum to the test suction points. Smaller test points will be drilled at select distances from the test suction points and a manometer will be utilized to measure the pressure differential. The data from the communication test and the measured volume of the exhaust system will be used to determine the number of suction points and the types and capacities of suction blowers required for the SSDS.

Incremental vacuum rates will be applied to each extraction well for a period of two hours or longer, as determined by field readings. Applied vacuum rates will be regulated through the use of a dilution valve. During testing, if short circuiting is encountered at an extraction well, or in the SSDS testing area, provisions will be made to seal any cracks in the existing concrete slab. Field monitoring during testing will ensure that no short circuiting will occur.

Several ½" temporary vacuum monitoring points will be drilled through the existing concrete floor slab at various locations extending radially outward from the test well at 5-foot increments. These test points will be used during the test to collect vacuum influence readings as the test progresses.

The testing equipment will consist of the following equipment:

- 3.0 hp Regenerative Vacuum Blower (Max Flow 200 cfm, Max vacuum 75" H_2O).
- Digital Manometer
- Digital Air Flow Meter
- Photo-Ionization Detector (PID)

During pilot testing, the effluent stream will be monitored for VOCs using a PID, and the air flow rate will be measured. Following the tests, the suction points will be removed and concrete will be used to match the existing concrete thickness and fill in the test ports.

The pilot test data sheets and a figure showing the locations of the pilot test extraction wells and monitoring points will be provided with final design layout.

The communication test will be conducted upon approval of the IRM WP and a design document will be submitted to NYSDEC for approval prior to the installation of the SSDS. The design and layout of the proposed communication test is depicted on Figure 7.

5.2 IRM Action: Soil Vapor Intrusion Remedy – Sub-slab Depressurization System

An active SSDS will be installed to minimize the potential for vapor intrusion into the on-Site building, as compared to the building environment determined during the communication test. The SSDS will depressurize below the current building slab as compared to the building environment. The SSDS will be designed to create a pressure differential of approximately -0.02 in-wc beneath the building slab, as compared to the interior building air pressure. The SSDS will be a permanent engineering control for the Site.

The SSDS will consist of a minimum of 20 suction pits installed beneath the building slab in the basement and four suction pits in the area of the building without a basement. All suction pits that will be connected to a blower on the roof via cast iron (interior) and PVC (exterior) piping. The layout of the suction pits is based on an assumed radius-of-influence of 20 feet, to be confirmed by the communication test. To create the suction pits, the existing slab will be saw cut and the underlying soil will be removed to a depth of at least 18 inches. The void space will be lined with geotextile fabric and a layer of ¾" clean stone aggregate (or similar material). The permanent suction pit design and installation methodology will be the same as the temporary extraction point design and installation, as described in Section 5.1 above.

Several pressure monitoring points will be installed through the slab to confirm the resulting pressure field. The layout of the proposed suction pits and monitoring points is included on Figure 8 and the details are shown on Figure 9.

The existing building slab will be inspected for cracks. If any are identified, they will be filled with non-VOC sealant (e.g., Retro-Coat™ caulk by Land Science Technologies).

A cast iron pipe (4" nominal size) will be inserted into each suction pit. The slab penetration points will be sealed with a chemically-resistant sealant (e.g., bituthene liquid membrane). The riser pipes will connect to exterior common PVC header pipes that will run outside the building to the roof. All horizontal piping runs will be slightly pitched back towards the pressure relief point to allow for drainage of any moisture. The final location of all vertical riser piping, header piping, and roof mounts will be determined by a Professional Engineer in consultation with the building owner.

A blower capable of creating the required flow will be mounted on the roof. In order to size the blower, a blower test (described below) will be performed after the sub-grade components are installed under the building slab. An Obar Systems GBR76UD is the blower assumed for the design.

To avoid entry of extracted subsurface vapors into the building, the vent pipe's exhaust will conform to the NYSDOH Soil Vapor Intrusion Guidance, specifically *Section 4.2.2(c)(6), System-specific recommendations*, which reads:

To avoid entry of extracted subsurface vapors into the building, the vent pipe's exhaust should be:

i. Above the eave of the roof (preferable, above the highest eave of the building at least 12 inches above the surface of the roof),
ii. At least 10 feet above ground level,
iii. At least 10 feet away from any opening that is less than 2 feet below the exhaust point, and
iv. 10 feet from any adjoining or adjacent buildings, or HVAC intakes or supply registers.

A vapor treatment system will be installed to treat the blower effluent prior to exhausting into the atmosphere. The vapor treatment system will consist of granulated activated carbon (GAC) that will require routine carbon change outs. The treated soil vapor will be released into the atmosphere from an effluent stack on the roof. The vapor treatment system will be installed prior to system start-up and will be utilized during system start-up and initial system operation. The vapor treatment system will not be removed without written confirmation from NYSDEC. The exhaust location, labeling, alarms and system components have been designed in general accordance with the NYSDOH Soil Vapor Guidance. The proposed discharge location is shown on Figure 11.

Following the installation of the SSDS pits, a blower test will be completed in order to size the blower. A regenerative blower will be mobilized to the Site and a step-test will be completed to determine the flows from each suction pit to depressurize below the slab at least -0.02 in-wc. The final blower selection will be provided to DEC prior to installation.

The remedial contractor will be required to obtain a permit from the New York City Department of Buildings (NYCDOB). The contractor will submit signed and stamped SSDS drawings to the NYCDOB as part of the permit application prior to SSDS installation. If the system design is modified following the start-up sampling, updated drawings will be submitted to the NYCDOB and, if necessary, a permit modification should be requested.

Initial Startup

After the system has been installed, the following will be completed to ensure that the system meets the remedial goal of a -0.02 in-wc or greater pressure differential.

- Visual inspection of the building slab for any cracks or holes. If any are identified, they will be sealed.
- Measurement of the sub-slab pressure at permanent pressure-monitoring points to ensure that the remedial goal of -0.02 in-wc has been achieved. If the startup is not conducted during heating season, the pressure differential will also be measured during heating season to ensure the remedial goal of -0.02 in-wc has been achieved.
- If appliances that rely on natural draft for exhaust of carbon monoxide and other combustion gases are identified, the potential for back draft will be tested. The potential for back draft will be determined using a carbon monoxide meter. If any back draft is identified, it will be corrected.

An effluent vapor sample will be collected in laboratory-supplied 2.7-liter Summa canisters using a two-hour regulators. The sample will be sealed, labeled, and placed in a secure container for delivery to a NYSDOH ELAP-certified analytical laboratory. The effluent soil vapor sample will be analyzed for EPA Method TO-15 VOCs, including naphthalene. The flow in the riser will also be measured so that the effluent conditions can be evaluated for possible treatment with vapor phase granulated activated carbon (VPGAC)

under the NYSDEC DAR Policy DAR-1: Guidelines for the Evaluation and Control of Ambient Air Contaminants under 6 NYCRR Part 212, February 2021

An alarm system will be installed that will notify the building management if a drop in pressure indicates that the system is not operating as designed. In general, a pressure switch will be placed on the main riser with a field-set switch point. The alarm will be audible and visual and mounted in the building. If a full-time attendant is not assigned to oversee the performance of the SSDS, a telemetry system will be installed that is capable of notifying building management of any operational issues via electronic communication.

Operations, Maintenance and Monitoring (OM&M) Plan

An Interim SMP will be prepared that includes an OM&M Plan submitted to NYSDEC with the CCR. The OM&M Plan will be used to determine the efficacy of the SSDS system after system start-up.

System Shut-down
A proposal to discontinue the SSDS may be made based on confirmatory sampling. The SSDS will not be shut down unless written approval is obtained from NYSDEC and NYSDOH.

5.3 Institutional Controls

An Interim SMP will be prepared to address the management of residual contamination on-Site. See Section 7.4 for a detailed description of the Interim SMP. Site Management continues in perpetuity or until released in writing by NYSDEC.

Upon completion of the entire Site remedy, an Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, will be filed and recorded with the New York City Office of the City Register. The Environmental Easement will be submitted as part of the Final Engineering Report. The Environmental Easement renders the Site a Controlled Property.

6.0 REMEDIAL PERFORMANCE EVALUATION

6.1 Sub-Slab Depressurization System

Efficacy of the SSDS will be confirmed via pressure field extension testing at monitoring points installed throughout the slab. A target negative pressure of 0.02 inches of water column will be used to confirm adequate vacuum is being maintained under the slab. Baseline (prior to SSDS start-up) and post-mitigation (one month following SSDS start-up) indoor air sampling will be conducted for additional evaluation of the SSDS.

6.1.1 Methodology

At each pressure monitoring location, a VaporPin® sampling probe will be installed through the cellar slab. The permanent monitoring point will consist of a stainless steel VaporPin® assembly including through-slab sleeves, flush-mount caps and sieves and will be installed utilizing a hand-held hammer drill with a concrete drill bit. The bottom of the sieve will be set no more than one inch below the bottom of the slab using 1.5-inch extenders below the vapor pin, as necessary.

The proposed pressure monitoring point locations are shown on Figure 8 and the details on Figure 9.

Baseline indoor air sampling will be conducted on-Site prior to the start-up of the SSDS. Post-mitigation indoor air sampling will be completed after 30 days from start-up of the SSDS for comparison to pre-mitigation contaminant concentrations. It is anticipated that three indoor air samples will be collected from the cellar level and three indoor air samples will be collected from the first floor within the Site building prior to and following implementation of the IRM. All post-mitigation indoor air samples will be analyzed for VOCs via EPA Method TO-15.

All post-mitigation indoor air samples will be collected in accordance with the NYSDOH Soil Vapor Guidance. Sample locations will coincide with the baseline sample locations, but may be adjusted based on field observations or conditions.

For each indoor sampling event, one ambient (background) air sample will be collected outside of the on-Site building in the downgradient wind direction. Ambient air samples will be collected in accordance with the methodology outlined below for the collection of indoor air samples.

Indoor air samples will be collected during the heating season in laboratory-supplied 6-liter Summa canisters using eight-hour regulators and will be sealed, labeled, and placed in a secure container for delivery to a NYSDOH ELAP-certified analytical laboratory. Samples will be collected from breathing height (three to five feet above the floor) from within the on-Site building. The sampling flow rate will not exceed 0.2 L/min. Sampling will occur for a duration of eight hours, consistent with the proposed use. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

Confirmatory pre- and post-mitigation efficacy sampling will occur during implementation of the IRM, with post-mitigation sampling occurring after SSDS activation. Confirmatory indoor air resampling will be conducted during the 2025-2026 heating season to accurately evaluate SSDS operations during operation of the building's heating system.

Proposed baseline and post-mitigation indoor air sample locations are depicted on Figure 10. A Quality Assurance Project Plan (QAPP) is included as Appendix C.

6.1.2 Reporting of Results

The results of the indoor and ambient air sampling will be presented in the CCR and will describe Site conditions and document applicable observations made during the sample collection. In addition, the CCR will include a description of the sampling procedures, tabulated sample results and an assessment of the data and conclusions. The laboratory data packages, data usability summary report (DUSR), and field notes will be included in the CCR as appendices. All data will also be submitted electronically to NYSDEC via the Environmental Information Management System (EIMS) in EqUIS format.

6.1.3 DUSR

A qualified data validator will prepare a DUSR for all indoor and ambient air samples collected. The DUSR will be prepared according to the guidelines contained in Appendix 2B of DER-10.

6.1.4 Green Remediation Techniques

Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and Site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling, and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and,
- Integrating the remedy with the end use where possible.

7.0 REPORTING

This section outlines the reporting requirements for the Site. All daily and monthly reports will be included in the CCR. Job-Site record keeping for all IRM work will be appropriately documented. These records will be maintained on-Site at all times during the project and will be available for inspection by NYSDEC and NYSDOH staff.

The results of pre- and post-mitigation SVI sampling, as well as any additional testing needed to demonstrate system efficacy, including resampling during the heating season, will be sent to the NYSDEC and the NYSDOH upon receipt from the laboratory in a letter-style submittal that summarizes results and compares them to the NYSDOH SVI matrices and applicable guidance values. Once all data has been collected and IRM work is complete, the results will be included in the CCR.

7.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each day following the reporting period and will include:

- An update of progress made during each day;
- Locations of work being performed;
- Photographs of work completed each day;
- A summary of work planned for the following day;
- The names and titles of staff performing on-Site IRM activities;
- A timeline of daily work activities, including start and end times;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP findings, including exceedances;
- A summary of any data collected in association with IRM activities;
- An explanation of notable Site conditions; and,
- Any deviations from the approved work plan.

Daily reporting and CAMP will be conducted during ground intrusive activities and soil handling activities. NYSDEC and the NYSDOH will be notified of CAMP results that exceed action levels, including duration and actions taken in response to any such exceedance. Notifications will be provided to the NYSDEC and the NYSDOH as soon as possible, within a minimum 24 hours from the exceedance event.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC or NYSDOH of emergencies (accidents, spills, etc.), requests for changes to the IRM WP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Any and all Site notifications, including emergency conditions and changes to the IRM WP, will be addressed directly to the NYSDEC PM and the NYSDOH PM via personal communication.

Daily reports will include a description of daily activities keyed to a map for the Site that identifies work areas. These reports will include a summary of air sampling results, odor and dust problems and corrective actions, and any complaints received from the public. All complaints received will immediately be reported to the NYSDEC PM and the NYSDOH PM.

The NYSDEC assigned project number will appear on all reports.

7.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10th day of the following month and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Description of all results of sampling and tests and all other data received or generated by or on behalf of Applicant in connection with this Site, whether under this Agreement or otherwise, in the previous reporting period, including quality assurance/quality control information;
- Information regarding activities undertaken in support of the Citizen Participation Plan during the previous reporting period and those anticipated for the next reporting period; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

7.3 Interim Remedial Measures Construction Completion Report

An Interim Remedial Measures Construction Completion Report (IRM CCR) will be submitted to NYSDEC after completion of the IRM, and will include the following:

1. Certification by the RE that the interim remedial measures conformed to the IRM WP;
2. Certification by the RE that dust, odor, and vapor control measures were implemented during invasive work and conformed with the IRM WP;
3. Certification by the RE that any remedial waste was transported and disposed in accordance with the IRM WP;
4. Certification by the RE that the source approval and sampling of imported acceptable fill was completed in a manner consistent with the methodology of the IRM WP, if applicable;
5. Summary of the IRM and all mitigation actions completed;
6. SSDS as-builts and details certified by the RE;
7. Description of any problems encountered and their resolutions;
8. Description of contamination remaining on-Site, if applicable;
9. IRM performance and documentation sampling;
10. Description of any deviations from the approved IRM WP;
11. Listing of waste streams, quantity of materials disposed, and where they were disposed;
12. List of the remediation standards applied to the mitigation actions;
13. List of all applicable local, regional, and national governmental permits, certificates, or other approvals required for the mitigation work;
14. Tables and figures containing all pre- and post-mitigation data, including volumes of soil removed, if applicable;
15. Description of source and quality of fill, if applicable;
16. Air quality and dust monitoring data, including any supporting documentation on the decisions made based on the data;
17. Data Usability Summary Reports for all data collected as part of the IRM;
18. Copies of all the submitted periodic reports; and
19. Copies of all manifests of off-Site transport of waste material, if applicable.

All documents and reports submitted to the NYSDEC will be in digital format. These digital documents shall be in PDF form and, where appropriate, supplemented by photos and Microsoft Excel files. Laboratory analytical data will be submitted in an electronic data deliverable (EDD) format that complies with the NYSDEC's electronic data warehouse standards.

7.4 Interim Site Management Plan

An Interim Site Management Plan (SMP) will be prepared following implementation of this IRM WP and will identify the requirements for:

1. Changes or deletions approved by DER for any necessary plans, including a HASP and CAMP;
2. Assessing compliance with any discharge limits established for the Site by a permit or permit equivalent, if applicable;
3. Assessing whether the remedial treatment components, if any, are achieving their performance criteria;
4. Assessing achievement of mitigation action objectives;
5. Evaluating Site information periodically, to confirm that the remedy continues to be effective in protecting public health and the environment;
6. Sampling and analysis of appropriate media; and,
7. Preparation of necessary reports of the results of this monitoring.

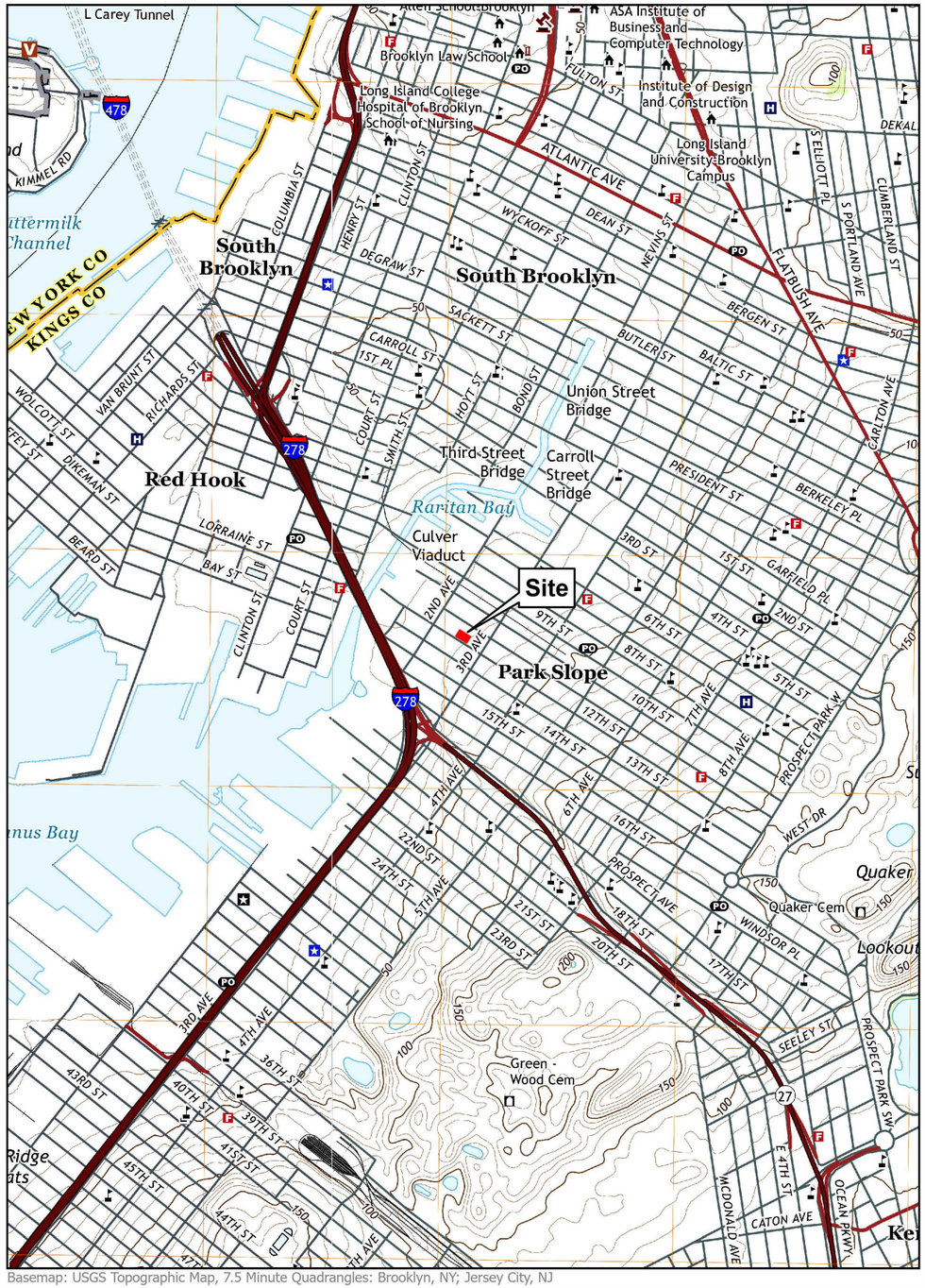
The Interim SMP will be submitted to NYSDEC after completion of the IRM, and will include the following documentation of the IRM:

1. Notifications: notifications will be sent to the NYSDEC and NYSDOH PMs, as needed, in accordance with DER-10;
2. Site Contact List inclusive of Site and State agency contacts;
3. Summary of previous investigation and/or remedial actions, if applicable;
4. A description of engineering and institutional controls;
5. An Operations, Maintenance and Monitoring Plan (OM&M);
6. Reporting requirements in accordance with DER-10;
7. As-built drawings;
8. Monitoring data;
9. Manufacturer Information; and,
10. An Excavation Work Plan (EWP).

7.5 Remedial Action Work Plan

A RAWP will be submitted to NYSDEC and NYSDOH upon completion of the IRM and the Remedial Investigation (RI). All Site IRM activities will be included in the CCR and FER.

Figures



Basemap: USGS Topographic Map, 7.5 Minute Quadrangles: Brooklyn, NY; Jersey City, NJ

Site Location

0 2,000 4,000 Feet

http://gis.nyc.gov/taxmap/map.htm

Department of Finance Digital Tax Map

NYC OpenData, State of New Jersey, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

Department of City Planning MapPluto 2023 v1

STATE OF NEW YORK · MATTHEW M. CARROLL · LICENSED PROFESSIONAL ENGINEER · 091629

127 12th Street
Brooklyn, New York
Block 1020, Lot 52

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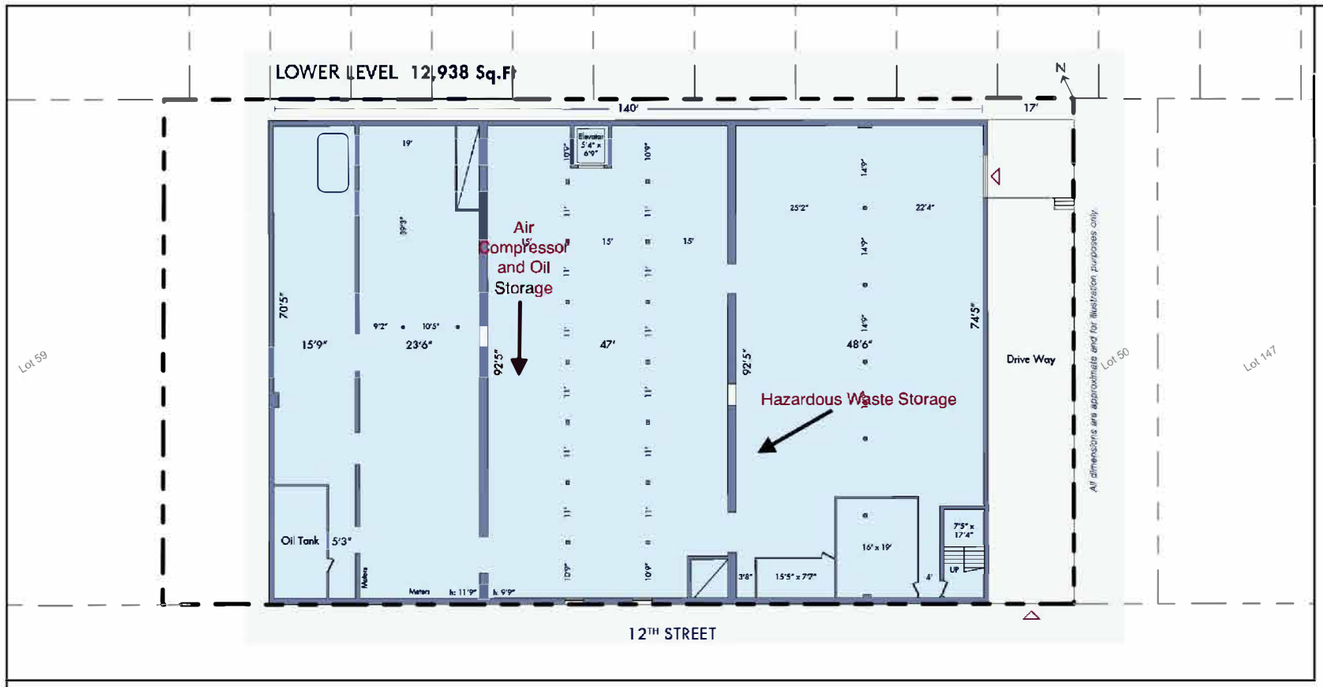
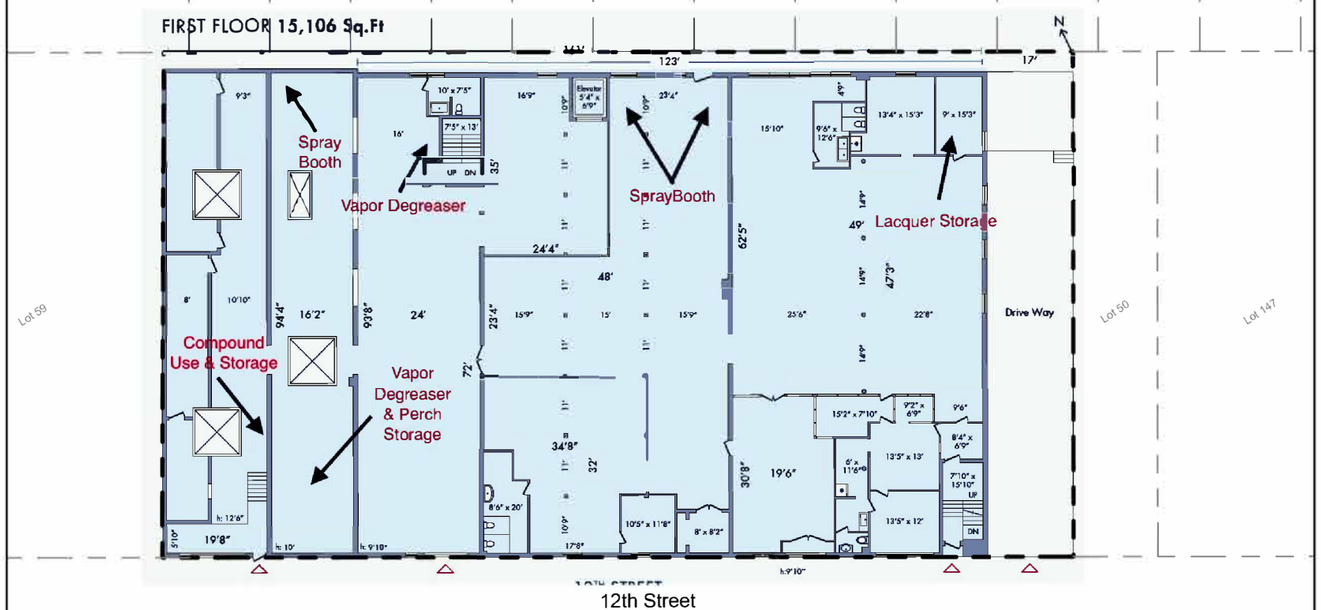
Drawn By	Checked By	Date	Scale
LM	MA	May 2023	As Noted

Drawing Title: Site Location Map

Drawing No.: Figure 1





Legend

NYC Tax Lots

Site Bounday

0 15 30 60 Feet

Reference:
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
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Bronx, NY 10461
NYS PE #091629

Drawn By	LM
Checked By	AP
Date	May 2025
Scale	As Noted
Drawing Title	Site Plan - Historical and Current Storage Areas
Drawing No.	Figure 2

Legend

- Soil Sample Location
- Groundwater and Soil Sample Location
- Groundwater Sample Location
- Indoor Air/Ambient Air Sample Location
- NYC Tax Lots
- Site Bounday
- First Floor Layout

Note:
Floor Plan shown is the Lower Level Plan
Except where noted as the First Floor Layout

0 10 20 40 Feet

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

STATE OF NEW YORK
MATTHEW M. CARROLL
LICENSED PROFESSIONAL ENGINEER
091629

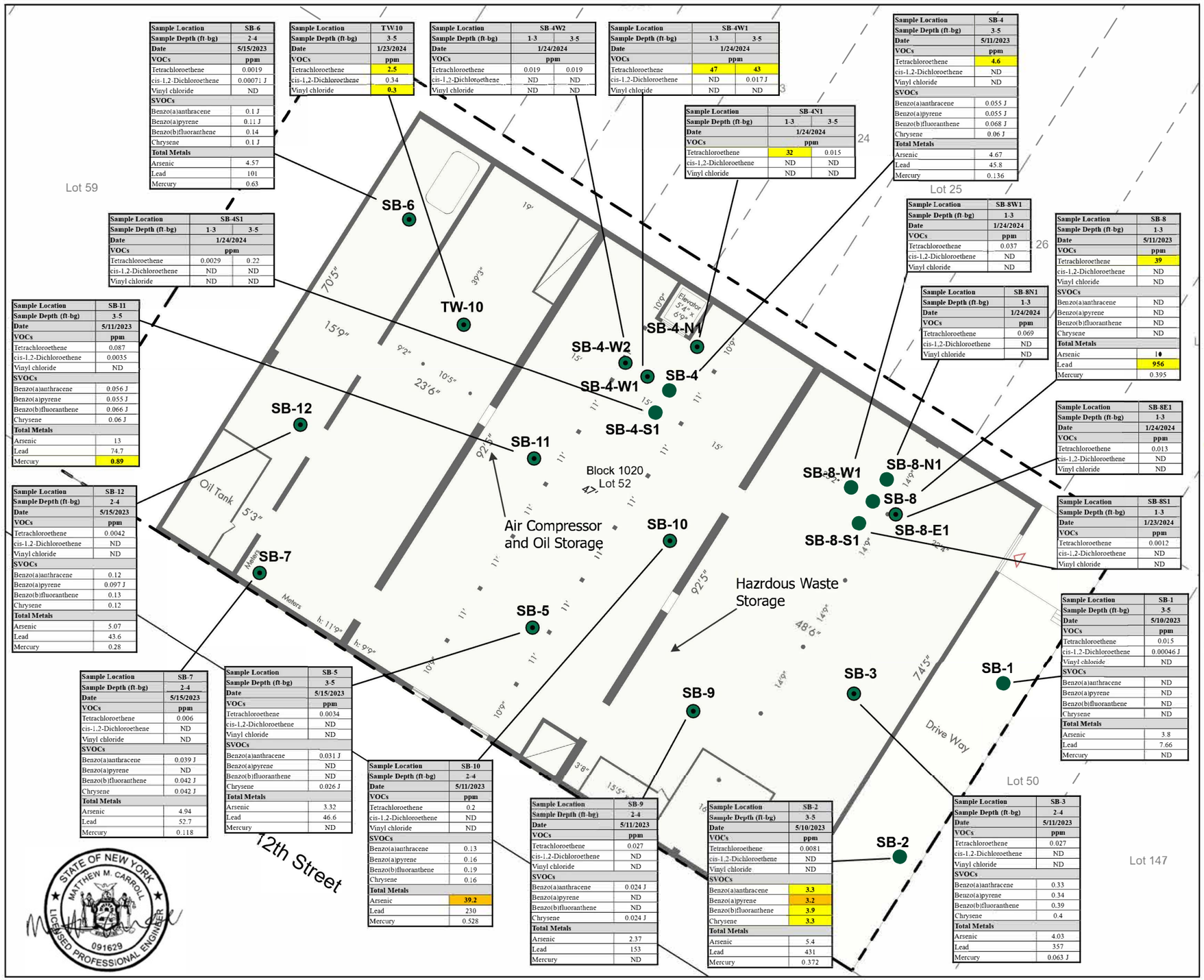
Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AP	May 2025	As Noted

Drawing Title: Previous Sample Location Map
2023/2024 Tenen Phase II

Drawing No.: Figure 3



Sample Location	SB-6
Sample Depth (ft-bg)	2-4
Date	5/15/2023
VOCs	ppm
Tetrachloroethene	0.0019
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.1 J
Benzo(a)pyrene	0.11 J
Benzo(b)fluoranthene	0.14
Chrysene	0.1 J
Total Metals	
Arsenic	4.57
Lead	101
Mercury	0.63

Sample Location	TW10
Sample Depth (ft-bg)	3-5
Date	1/23/2024
VOCs	ppm
Tetrachloroethene	2.5
cis-1,2-Dichloroethene	0.34
Vinyl chloride	0.3

Sample Location	SB-4W2	
Sample Depth (ft-bg)	1-3	3-5
Date	1/24/2024	
VOCs	ppm	
Tetrachloroethene	0.019	0.019
cis-1,2-Dichloroethene	ND	ND
Vinyl chloride	ND	ND

Sample Location	SB-4W1	
Sample Depth (ft-bg)	1-3	3-5
Date	1/24/2024	
VOCs	ppm	
Tetrachloroethene	47	43
cis-1,2-Dichloroethene	ND	0.017 J
Vinyl chloride	ND	ND

Sample Location	SB-4N1	
Sample Depth (ft-bg)	1-3	3-5
Date	1/24/2024	
VOCs	ppm	
Tetrachloroethene	32	0.015
cis-1,2-Dichloroethene	ND	ND
Vinyl chloride	ND	ND

Sample Location	SB-4
Sample Depth (ft-bg)	3-5
Date	5/11/2023
VOCs	ppm
Tetrachloroethene	4.6
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.055 J
Benzo(a)pyrene	0.055 J
Benzo(b)fluoranthene	0.068 J
Chrysene	0.06 J
Total Metals	
Arsenic	4.67
Lead	45.8
Mercury	0.136

Sample Location	SB-4S1	
Sample Depth (ft-bg)	1-3	3-5
Date	1/24/2024	
VOCs	ppm	
Tetrachloroethene	0.0029	0.22
cis-1,2-Dichloroethene	ND	ND
Vinyl chloride	ND	ND

Sample Location	SB-8W1
Sample Depth (ft-bg)	1-3
Date	1/24/2024
VOCs	ppm
Tetrachloroethene	0.037
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND

Sample Location	SB-8N1
Sample Depth (ft-bg)	1-3
Date	1/24/2024
VOCs	ppm
Tetrachloroethene	0.069
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND

Sample Location	SB-8
Sample Depth (ft-bg)	1-3
Date	5/11/2023
VOCs	ppm
Tetrachloroethene	39
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Chrysene	ND
Total Metals	
Arsenic	10
Lead	956
Mercury	0.395

Sample Location	SB-11
Sample Depth (ft-bg)	3-5
Date	5/11/2023
VOCs	ppm
Tetrachloroethene	0.087
cis-1,2-Dichloroethene	0.0035
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.056 J
Benzo(a)pyrene	0.055 J
Benzo(b)fluoranthene	0.066 J
Chrysene	0.06 J
Total Metals	
Arsenic	13
Lead	74.7
Mercury	0.89

Sample Location	SB-8E1
Sample Depth (ft-bg)	1-3
Date	1/24/2024
VOCs	ppm
Tetrachloroethene	0.013
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND

Sample Location	SB-12
Sample Depth (ft-bg)	2-4
Date	5/15/2023
VOCs	ppm
Tetrachloroethene	0.0042
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.12
Benzo(a)pyrene	0.097 J
Benzo(b)fluoranthene	0.13
Chrysene	0.12
Total Metals	
Arsenic	5.07
Lead	43.6
Mercury	0.28

Sample Location	SB-8S1
Sample Depth (ft-bg)	1-3
Date	1/23/2024
VOCs	ppm
Tetrachloroethene	0.0012
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND

Sample Location	SB-1
Sample Depth (ft-bg)	3-5
Date	5/10/2023
VOCs	ppm
Tetrachloroethene	0.015
cis-1,2-Dichloroethene	0.00046 J
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Chrysene	ND
Total Metals	
Arsenic	3.8
Lead	7.66
Mercury	ND

Sample Location	SB-7
Sample Depth (ft-bg)	2-4
Date	5/15/2023
VOCs	ppm
Tetrachloroethene	0.006
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.039 J
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	0.042 J
Chrysene	0.042 J
Total Metals	
Arsenic	4.94
Lead	52.7
Mercury	0.118

Sample Location	SB-5
Sample Depth (ft-bg)	3-5
Date	5/15/2023
VOCs	ppm
Tetrachloroethene	0.0034
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.031 J
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Chrysene	0.026 J
Total Metals	
Arsenic	3.32
Lead	46.6
Mercury	ND

Sample Location	SB-10
Sample Depth (ft-bg)	2-4
Date	5/11/2023
VOCs	ppm
Tetrachloroethene	0.2
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.13
Benzo(a)pyrene	0.16
Benzo(b)fluoranthene	0.19
Chrysene	0.16
Total Metals	
Arsenic	39.2
Lead	230
Mercury	0.528

Sample Location	SB-9
Sample Depth (ft-bg)	2-4
Date	5/11/2023
VOCs	ppm
Tetrachloroethene	0.027
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.024 J
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Chrysene	0.024 J
Total Metals	
Arsenic	2.37
Lead	153
Mercury	ND

Sample Location	SB-2
Sample Depth (ft-bg)	3-5
Date	5/10/2023
VOCs	ppm
Tetrachloroethene	0.0081
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	3.3
Benzo(a)pyrene	3.2
Benzo(b)fluoranthene	3.9
Chrysene	3.3
Total Metals	
Arsenic	5.4
Lead	431
Mercury	0.372

Sample Location	SB-3
Sample Depth (ft-bg)	2-4
Date	5/11/2023
VOCs	ppm
Tetrachloroethene	0.027
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	0.33
Benzo(a)pyrene	0.34
Benzo(b)fluoranthene	0.39
Chrysene	0.4
Total Metals	
Arsenic	4.03
Lead	357
Mercury	0.063 J

Analyte	NY-PGW	NY-RESC
VOCs	ppm	
Tetrachloroethene	1.3	150
cis-1,2-Dichloroethene	0.25	500
Vinyl chloride	0.02	13
SVOCs		
Benzo(a)anthracene	1	5.6
Benzo(a)pyrene	22	1
Benzo(b)fluoranthene	1.7	5.6
Chrysene	1	56
Total Metals		
Arsenic	16	16
Lead	450	1000
Mercury	0.73	2.8

Notes:

1. **Bold and shaded yellow value indicates concentration exceeds NY-PGW SCOs**
2. Bold and shaded orange value indicates concentration exceeds NY-RESC SCOs
3. NY-PGW = 6 NYCRR Part 375 Restricted Protection of Groundwater Soil Cleanup Objectives
4. NY-RESC = 6 NYCRR Part 375 Restricted-Residential Use Soil Cleanup Objectives
5. J = Estimated value
6. ND = Not detected
7. ppm = parts per million
8. Soil samples collected during Tenen's January 2024 sampling event were analyzed for VOCs only

Legend

- Soil Sample Location
- NYC Tax Lots
- Site Bounday
- **Site Bounday**

0 10 20 40 Feet

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

STATE OF NEW YORK MATTHEW M. CARROLL LICENSED PROFESSIONAL ENGINEER 091629

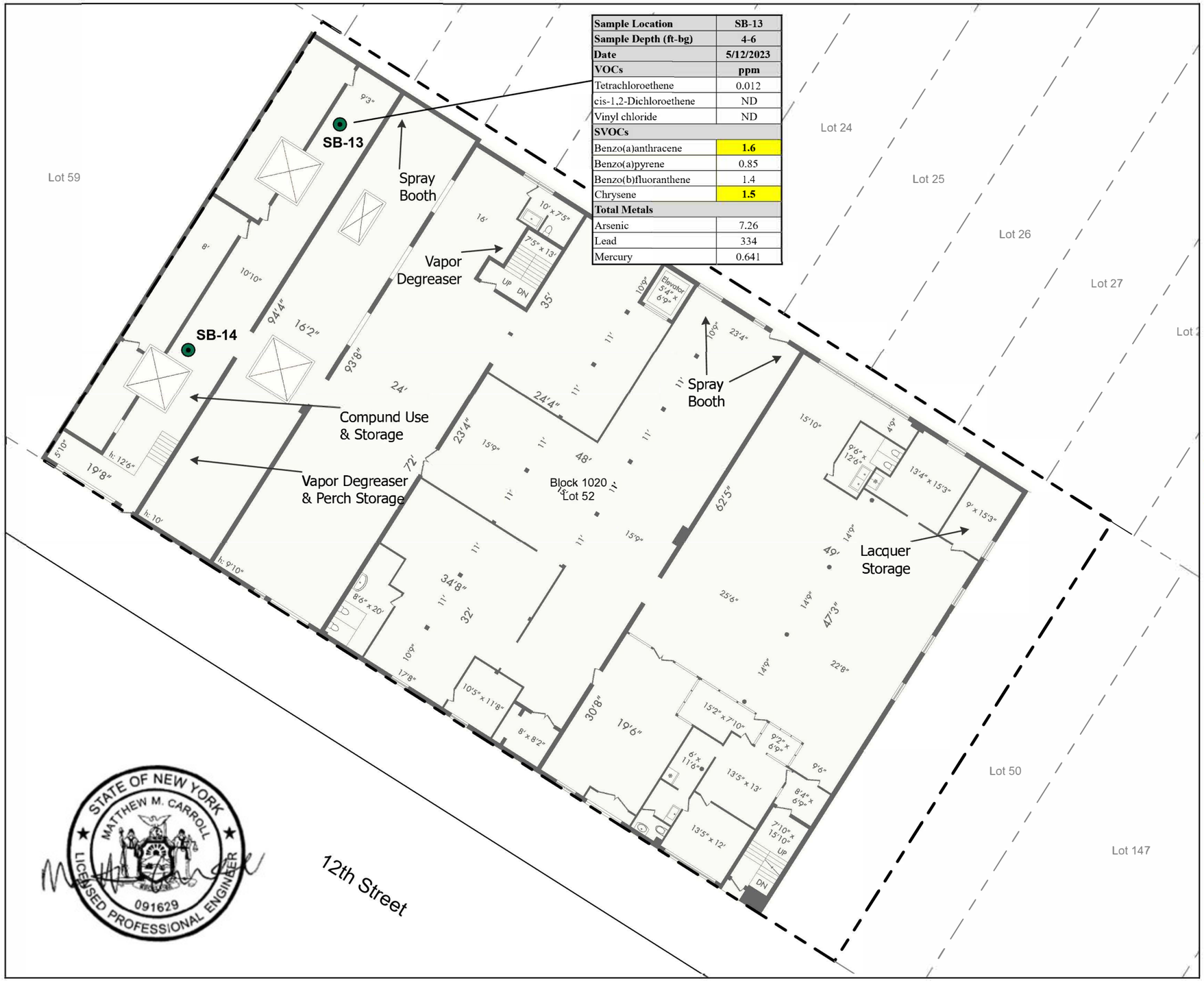
Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AP	June 2025	As Noted

Drawing Title: Phase II Soil Analytical Results - Basement

Drawing No.: Figure 4A



Sample Location	SB-13
Sample Depth (ft-bg)	4-6
Date	5/12/2023
VOCs	**ppm**
Tetrachloroethene	0.012
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
SVOCs	
Benzo(a)anthracene	**1.6**
Benzo(a)pyrene	0.85
Benzo(b)fluoranthene	1.4
Chrysene	**1.5**
Total Metals	
Arsenic	7.26
Lead	334
Mercury	0.641

Analyte	NY-PGW	NY-RESC
VOCs	**ppm**	
Tetrachloroethene	1.3	150
cis-1,2-Dichloroethene	0.25	500
Vinyl chloride	0.02	13
SVOCs		
Benzo(a)anthracene	1	5.6
Benzo(a)pyrene	22	1
Benzo(b)fluoranthene	1.7	5.6
Chrysene	1	56
Total Metals		
Arsenic	16	16
Lead	450	1000
Mercury	0.73	2.8

Notes:

1. **Bold and shaded yellow value indicates concentration exceeds NY-PGW SCOs**
2. Bold and shaded orange value indicates concentration exceeds NY-RESC SCOs
3. NY-PGW = 6 NYCRR Part 375 Restricted Protection of Groundwater Soil Cleanup Objectives
4. NY-RESC = 6 NYCRR Part 375 Restricted-Residential Use Soil Cleanup Objectives
5. J = Estimated value
6. ND = Not detected
7. ppm = parts per million
8. Soil samples collected during Tenen's January 2024 sampling event were analyzed for VOCs only

Legend

- Soil Sample Location
- NYC Tax Lots
- Site Bounday

0 10 20 40 Feet

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

Interim Remedial Measures Work Plan
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Block 1020, Lot 52

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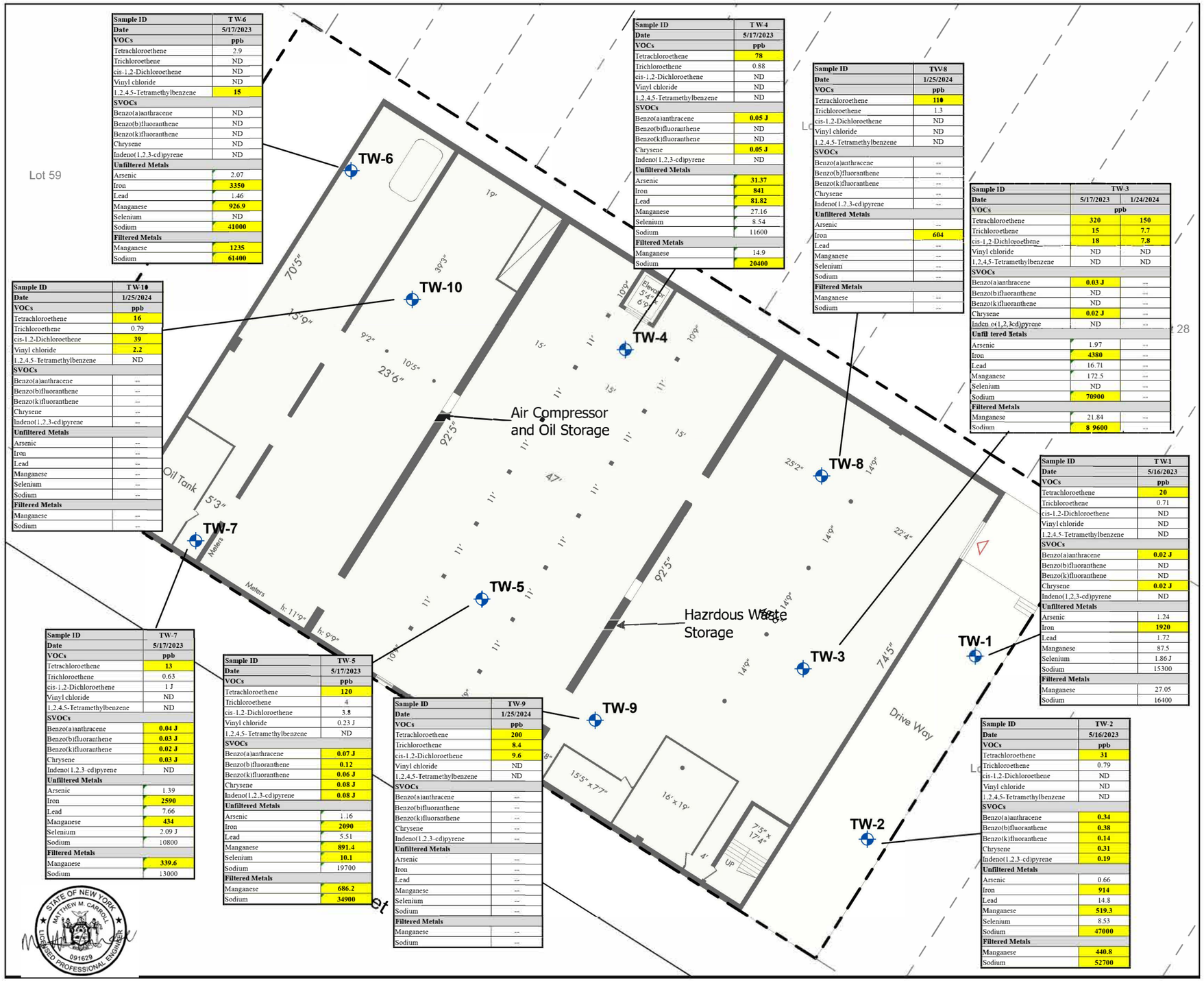
Drawn By	Checked By	Date	Scale
LM	AP	June 2025	As Noted

Drawing Title: Phase II Soil Analytical Results - Basement

Drawing No.: Figure 4B



Sample ID	TW-6
Date	5/17/2023
VOCs	ppb
Tetrachloroethene	2.9
Trichloroethene	ND
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	15
SVOCs	
Benzo(a)anthracene	ND
Benzo(b)fluoranthene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Indeno(1,2,3-cd)pyrene	ND
Unfiltered Metals	
Arsenic	2.07
Iron	3350
Lead	1.46
Manganese	926.9
Selenium	ND
Sodium	41000
Filtered Metals	
Manganese	1235
Sodium	61400

Sample ID	TW-4
Date	5/17/2023
VOCs	ppb
Tetrachloroethene	78
Trichloroethene	0.88
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	0.05 J
Benzo(b)fluoranthene	ND
Benzo(k)fluoranthene	ND
Chrysene	0.05 J
Indeno(1,2,3-cd)pyrene	ND
Unfiltered Metals	
Arsenic	31.37
Iron	841
Lead	81.82
Manganese	27.16
Selenium	8.54
Sodium	11600
Filtered Metals	
Manganese	14.9
Sodium	20400

Sample ID	TW-8
Date	1/25/2024
VOCs	ppb
Tetrachloroethene	110
Trichloroethene	1.3
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	--
Benzo(b)fluoranthene	--
Benzo(k)fluoranthene	--
Chrysene	--
Indeno(1,2,3-cd)pyrene	--
Unfiltered Metals	
Arsenic	--
Iron	604
Lead	--
Manganese	--
Selenium	--
Sodium	--
Filtered Metals	
Manganese	--
Sodium	--

Sample ID	TW-3	
Date	5/17/2023	1/24/2024
VOCs	ppb	
Tetrachloroethene	320	150
Trichloroethene	15	7.7
cis-1,2-Dichloroethene	18	7.8
Vinyl chloride	ND	ND
1,2,4,5-Tetramethylbenzene	ND	ND
SVOCs		
Benzo(a)anthracene	0.03 J	--
Benzo(b)fluoranthene	ND	--
Benzo(k)fluoranthene	ND	--
Chrysene	0.02 J	--
Indeno(1,2,3-cd)pyrene	ND	--
Unfiltered Metals		
Arsenic	1.97	--
Iron	4380	--
Lead	16.71	--
Manganese	172.5	--
Selenium	ND	--
Sodium	70900	--
Filtered Metals		
Manganese	21.84	--
Sodium	8 9600	--

Sample ID	TW-10
Date	1/25/2024
VOCs	ppb
Tetrachloroethene	16
Trichloroethene	0.79
cis-1,2-Dichloroethene	39
Vinyl chloride	2.2
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	--
Benzo(b)fluoranthene	--
Benzo(k)fluoranthene	--
Chrysene	--
Indeno(1,2,3-cd)pyrene	--
Unfiltered Metals	
Arsenic	--
Iron	--
Lead	--
Manganese	--
Selenium	--
Sodium	--
Filtered Metals	
Manganese	--
Sodium	--

Sample ID	TW-1
Date	5/16/2023
VOCs	ppb
Tetrachloroethene	20
Trichloroethene	0.71
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	0.02 J
Benzo(b)fluoranthene	ND
Benzo(k)fluoranthene	ND
Chrysene	0.02 J
Indeno(1,2,3-cd)pyrene	ND
Unfiltered Metals	
Arsenic	1.24
Iron	1920
Lead	1.72
Manganese	87.5
Selenium	1.86 J
Sodium	15300
Filtered Metals	
Manganese	27.05
Sodium	16400

Sample ID	TW-7
Date	5/17/2023
VOCs	ppb
Tetrachloroethene	13
Trichloroethene	0.63
cis-1,2-Dichloroethene	1 J
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	0.04 J
Benzo(b)fluoranthene	0.03 J
Benzo(k)fluoranthene	0.02 J
Chrysene	0.03 J
Indeno(1,2,3-cd)pyrene	ND
Unfiltered Metals	
Arsenic	1.39
Iron	2590
Lead	7.66
Manganese	434
Selenium	2.09 J
Sodium	10800
Filtered Metals	
Manganese	339.6
Sodium	13000

Sample ID	TW-5
Date	5/17/2023
VOCs	ppb
Tetrachloroethene	120
Trichloroethene	4
cis-1,2-Dichloroethene	3.8
Vinyl chloride	0.23 J
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	0.07 J
Benzo(b)fluoranthene	0.12
Benzo(k)fluoranthene	0.06 J
Chrysene	0.08 J
Indeno(1,2,3-cd)pyrene	0.08 J
Unfiltered Metals	
Arsenic	1.16
Iron	2090
Lead	5.51
Manganese	891.4
Selenium	10.1
Sodium	19700
Filtered Metals	
Manganese	686.2
Sodium	34900

Sample ID	TW-9
Date	1/25/2024
VOCs	ppb
Tetrachloroethene	200
Trichloroethene	8.4
cis-1,2-Dichloroethene	9.6
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	--
Benzo(b)fluoranthene	--
Benzo(k)fluoranthene	--
Chrysene	--
Indeno(1,2,3-cd)pyrene	--
Unfiltered Metals	
Arsenic	--
Iron	--
Lead	--
Manganese	--
Selenium	--
Sodium	--
Filtered Metals	
Manganese	--
Sodium	--

Sample ID	TW-2
Date	5/16/2023
VOCs	ppb
Tetrachloroethene	31
Trichloroethene	0.79
cis-1,2-Dichloroethene	ND
Vinyl chloride	ND
1,2,4,5-Tetramethylbenzene	ND
SVOCs	
Benzo(a)anthracene	0.34
Benzo(b)fluoranthene	0.38
Benzo(k)fluoranthene	0.14
Chrysene	0.31
Indeno(1,2,3-cd)pyrene	0.19
Unfiltered Metals	
Arsenic	0.66
Iron	914
Lead	14.8
Manganese	519.3
Selenium	8.53
Sodium	47000
Filtered Metals	
Manganese	440.8
Sodium	52700

Analyte	NY-AWQS
VOCs	ppb
Tetrachloroethene	5
Trichloroethene	5
cis-1,2-Dichloroethene	5
Vinyl chloride	2
1,2,4,5-Tetramethylbenzene	5
SVOCs	
Benzo(a)anthracene	0.002
Benzo(b)fluoranthene	0.002
Benzo(k)fluoranthene	0.002
Chrysene	0.002
Indeno(1,2,3-cd)pyrene	0.002
Unfiltered Metals	
Arsenic	25
Iron	300
Lead	25
Manganese	300
Selenium	10
Sodium	20000
Filtered Metals	
Manganese	300
Sodium	20000

Notes:

1. **Bold and shaded yellow value indicates concentration exceeds NY-AWQS**
2. NY-AWQS = NYSDEC Division of Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS)
3. ND = Not detected
4. ppb = parts per billion
5. -- = Not analyzed

Legend

- Groundwater Sample Location
- NYC Tax Lots
- Site Bounday

0 10 20 40 Feet

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

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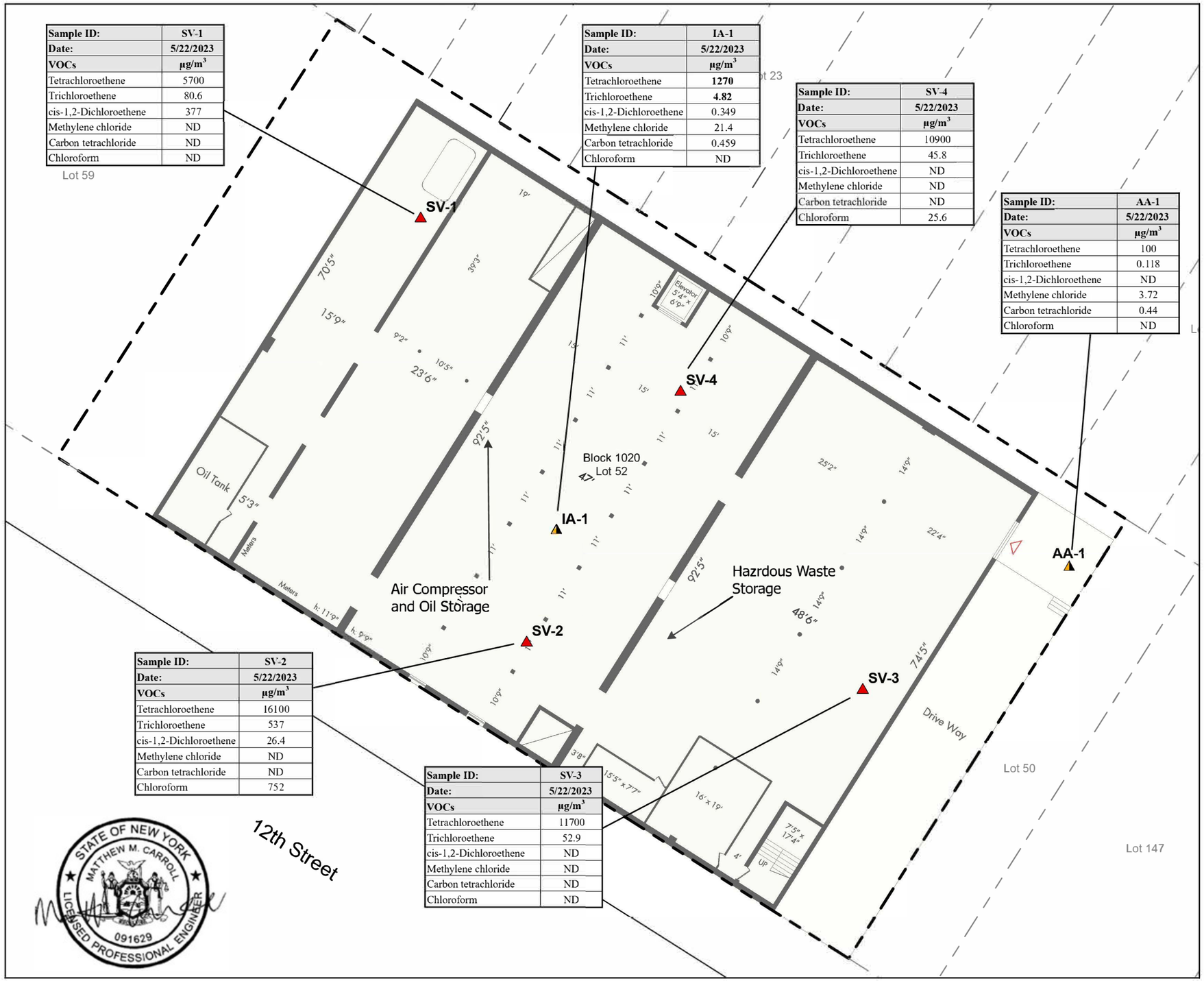
NYS PE #091629

Drawn By: LM
Checked By: AP
Date: June 2025
Scale: As Noted

Drawing Title: Phase II Groundwater Analytical Results

Drawing No.: Figure 5



Sample ID:	SV-1
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	5700
Trichloroethene	80.6
cis-1,2-Dichloroethene	377
Methylene chloride	ND
Carbon tetrachloride	ND
Chloroform	ND

Sample ID:	IA-1
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	**1270**
Trichloroethene	**4.82**
cis-1,2-Dichloroethene	0.349
Methylene chloride	21.4
Carbon tetrachloride	0.459
Chloroform	ND

Sample ID:	SV-4
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	10900
Trichloroethene	45.8
cis-1,2-Dichloroethene	ND
Methylene chloride	ND
Carbon tetrachloride	ND
Chloroform	25.6

Sample ID:	AA-1
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	100
Trichloroethene	0.118
cis-1,2-Dichloroethene	ND
Methylene chloride	3.72
Carbon tetrachloride	0.44
Chloroform	ND

Sample ID:	SV-2
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	16100
Trichloroethene	537
cis-1,2-Dichloroethene	26.4
Methylene chloride	ND
Carbon tetrachloride	ND
Chloroform	752

Sample ID:	SV-3
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	11700
Trichloroethene	52.9
cis-1,2-Dichloroethene	ND
Methylene chloride	ND
Carbon tetrachloride	ND
Chloroform	ND

Analyte	NYSDOH AGV
VOCs	µg/m³
Tetrachloroethene	30
Trichloroethene	2
cis-1,2-Dichloroethene	NS
Methylene chloride	60
Carbon tetrachloride	NS
Chloroform	NS

Notes:

1. **Bold value indicates concentration exceeds NYSDOH AGVs.**
2. NYSDOH AGVs = New York State Department of Health Air Guideline Values, Table 3.1 in NYSDOH Soil Vapor Guidance, October 2006 with May 2017 and February 2024 updates
3. Only indoor air concentrations are compared to NYSDOH AGVs
4. ND = Not Detected
5. µg/m³ = micrograms per cubic meter

Legend

- Soil Vapor Sample
- Indoor/Ambient Air Sample Location
- NYC Tax Lots
- Site Bounday

0 10 20 40 Feet

STATE OF NEW YORK
MATTHEW M. CARROLL
LICENSED PROFESSIONAL ENGINEER
091629

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

Interim Remedial Measures Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

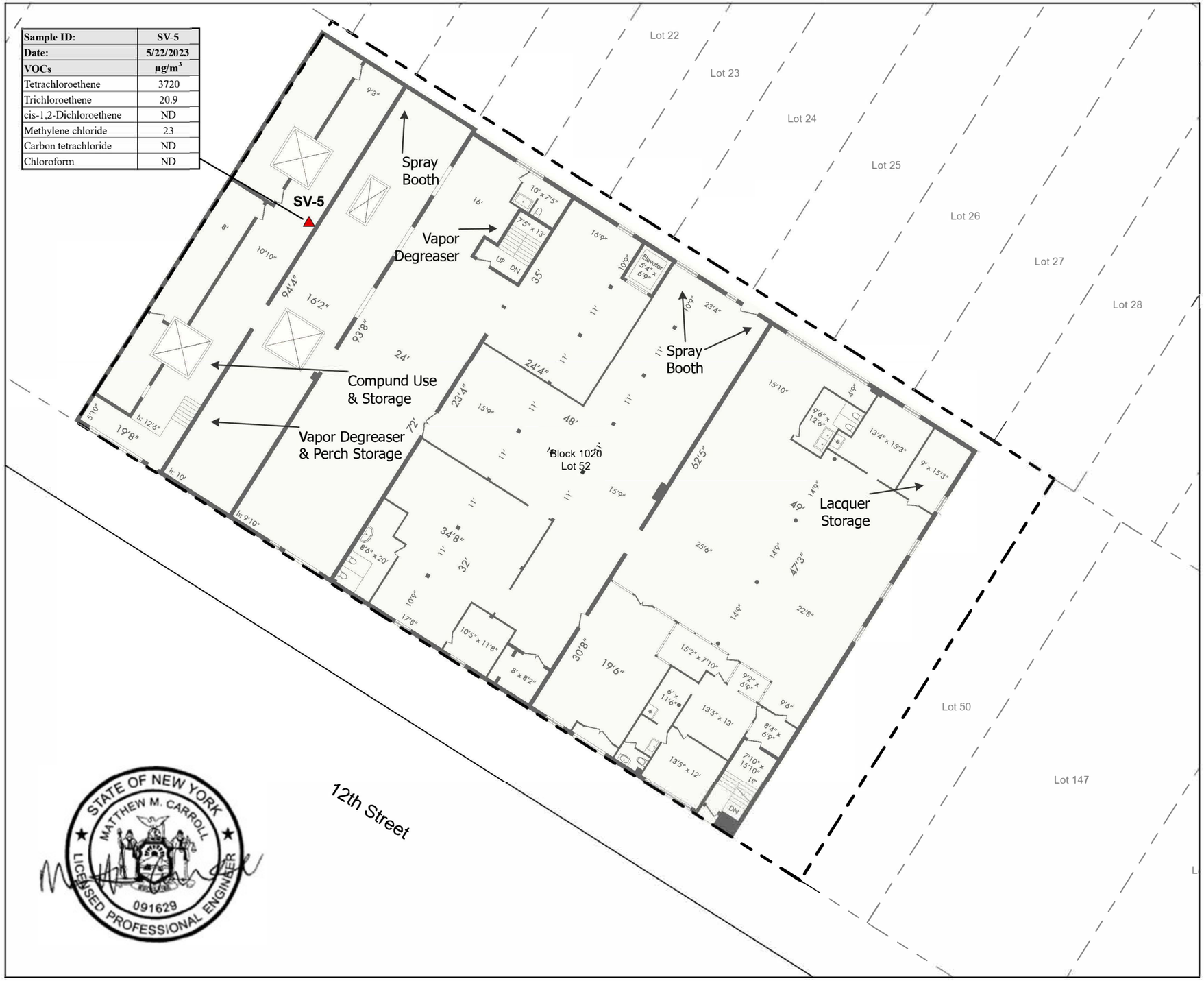
Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AP	June 2025	As Noted

Drawing Title: Phase II Soil Vapor and Indoor Air Analytical Results - Basement

Drawing No.: Figure 6A

Sample ID:	SV-5
Date:	5/22/2023
VOCs	µg/m³
Tetrachloroethene	3720
Trichloroethene	20.9
cis-1,2-Dichloroethene	ND
Methylene chloride	23
Carbon tetrachloride	ND
Chloroform	ND



Analyte	NYSDOH AGV
VOCs	µg/m³
Tetrachloroethene	30
Trichloroethene	2
cis-1,2-Dichloroethene	NS
Methylene chloride	60
Carbon tetrachloride	NS
Chloroform	NS

Notes:

1. Bold value indicates concentration exceeds NYSDOH AGVs.

2. NYSDOH AGVs = New York State Department of Health Air Guideline Values, Table 3.1 in NYSDOH Soil Vapor Guidance, October 2006 with May 2017 and February 2024 updates

3. Only indoor air concentrations are compared to NYSDOH AGVs

4. ND = Not Detected

5. µg/m³ = micrograms per cubic meter

Legend

- Soil Vapor Sample
- NYC Tax Lots
- Site Bounday
- **Site Bounday**

0 10 20 40 Feet

STATE OF NEW YORK
MATTHEW M. CARROLL
LICENSED PROFESSIONAL ENGINEER
091629

Reference:
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Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

Interim Remedial Measures Work Plan
127 12th Street
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Matthew M. Carroll, PE
1085 Sackett Avenue
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NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AP	June 2025	As Noted

Drawing Title: Phase II Soil Vapor Analytical Results - First Floor

Drawing No.: Figure 6B

N

W E

S

Legend

- NYC Tax Lots
- First Floor Layout
- Site Bounday
- Extraction Point
- Vacuum Monitoring Point

Note:
Floor Plan shown is the Lower Level Plan
Except where noted as the First Floor Layout

0 10 20 40 Feet

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

STATE OF NEW YORK
MATTHEW M. CARROLL
091629
LICENSED PROFESSIONAL ENGINEER

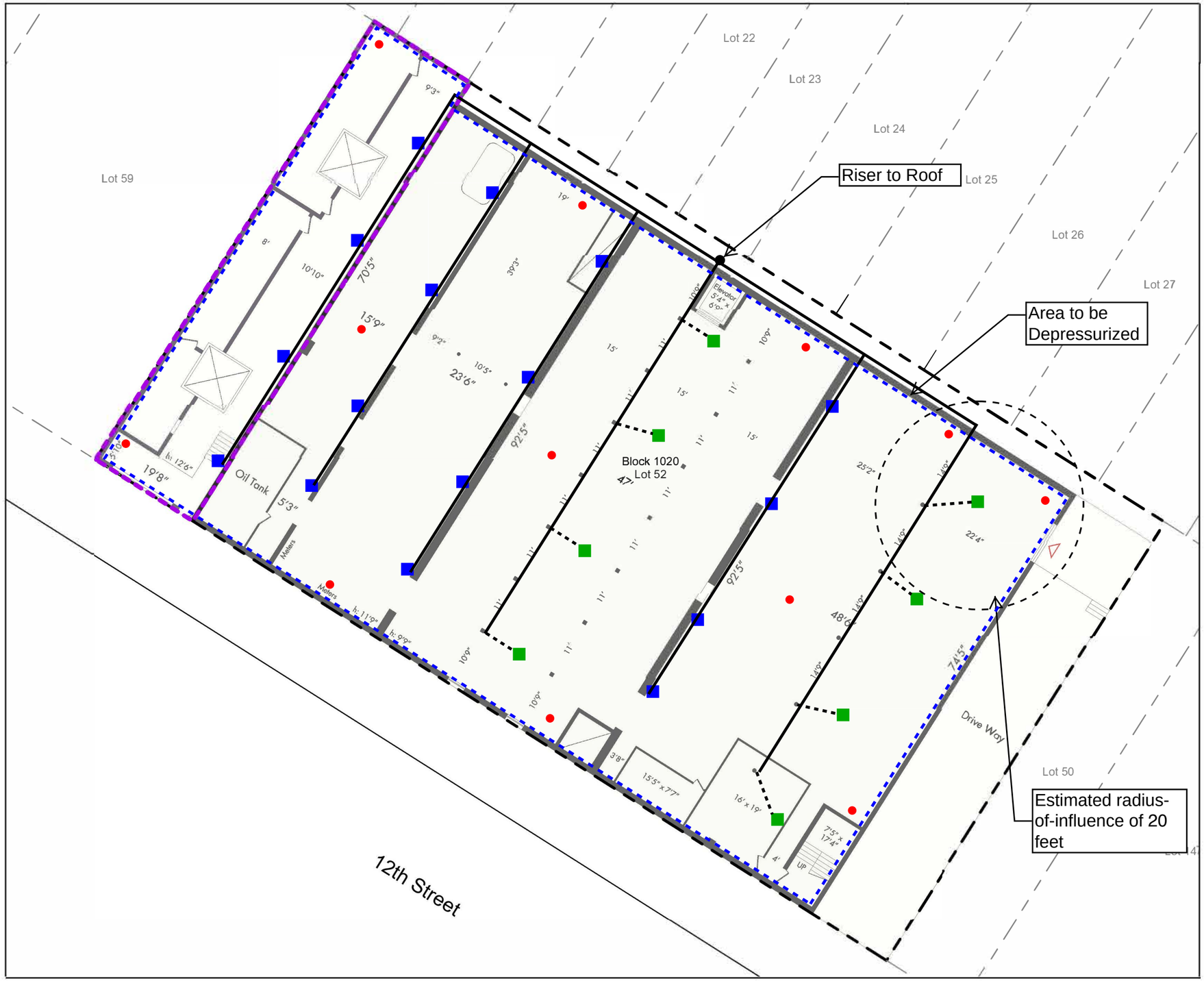
Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AC	May 2024	As Noted

Drawing Title: Pilot Test Locations

Drawing No.: Figure 7



Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

Legend

- NYC Tax Lots
- First Floor Layout
- Site Boundary
- Area to be Depressurized
- Suction Pit with Sub-grade PVC Piping to Column
- Suction Pit Along Wall
- Above-grade Cast Iron Piping
- Pressure Monitoring Point (PMP)

Note:
Floor Plan shown is the Lower Level Plan Except where noted as the First Floor Layout Interior features are approximate. Suction points, PMPs and piping routes are subject to change based on field conditions.

STATE OF NEW YORK
MATTHEW M. CARROLL
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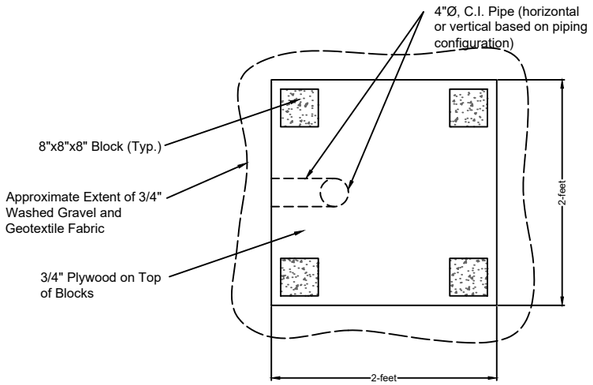
Interim Remedial Measures Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

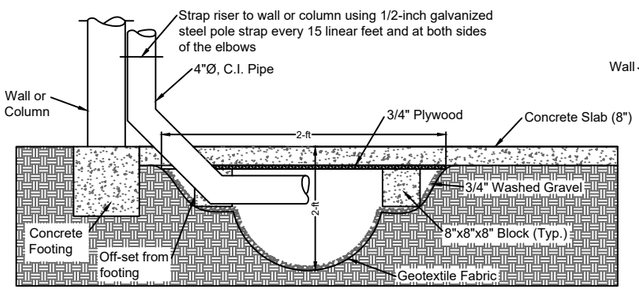
Drawn By	Checked By	Date	Scale
LM	AC	May 2024	As Noted

Drawing Title: SSDS Layout

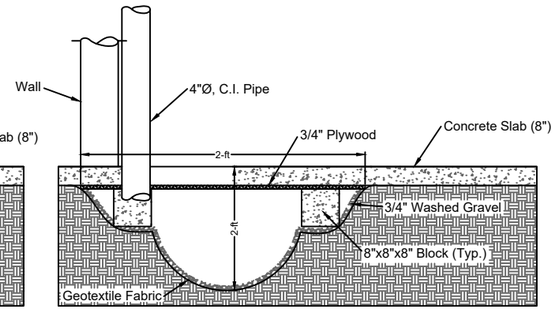
Drawing No.: Figure 8



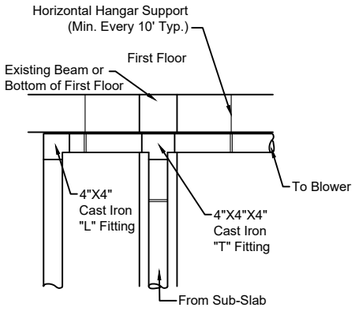
DETAIL 1: SUCTION PIT - PLAN VIEW
NOT TO SCALE



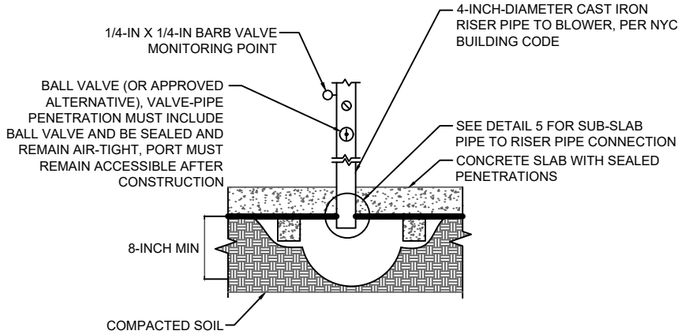
DETAIL 2: SUCTION PIT NEAR FOOTING - SECTION VIEW
NOT TO SCALE



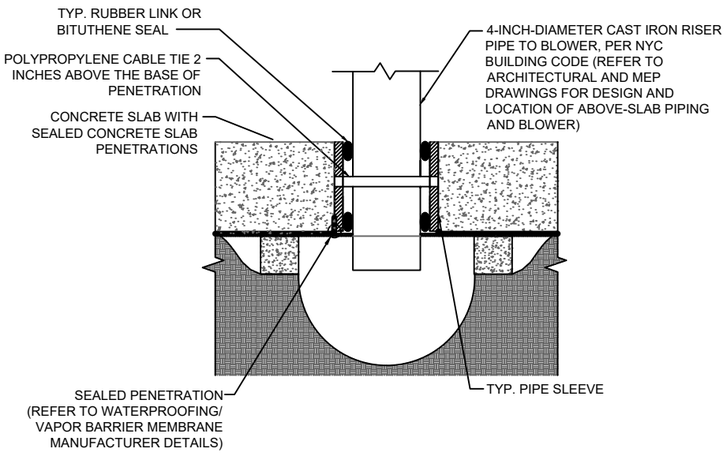
DETAIL 3: SUCTION PIT WITH NO FOOTING - SECTION VIEW
NOT TO SCALE



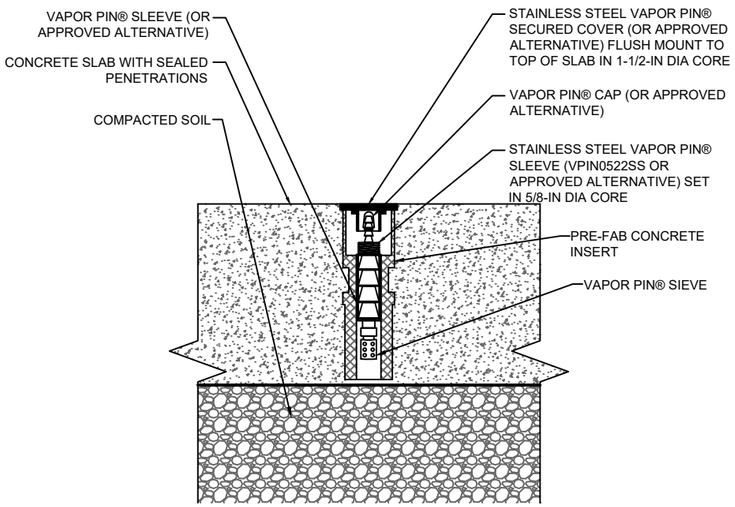
DETAIL 8: ABOVE GRADE PIPING
NOT TO SCALE



DETAIL 4: TYPICAL TRANSITION FROM SUB-SLAB PIPE TO RISER PIPE (SECTION VIEW)
NOT TO SCALE

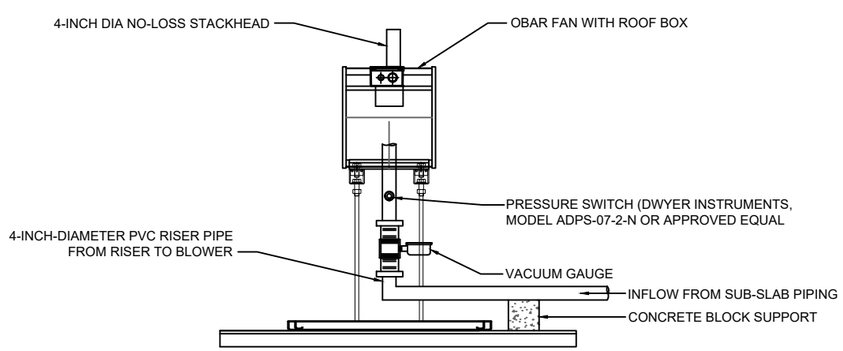


DETAIL 5: TYPICAL CONNECTION FROM SUB-SLAB PIPE TO VAPOR SEEL AT PIPE TRANSITION (SECTION VIEW)
NOT TO SCALE



NOTE: TYPICAL CONSTRUCTION SHOWN IN THE DETAIL. CONTRACTOR MUST FOLLOW MANUFACTURER INSTRUCTIONS/MANUALS FOR ACTUAL CONSTRUCTION. USE VAPOR PIN ® EXTENSION 1.5 AS NECESSARY TO EXTEND SIEVE TO WITHIN ONE INCH BELOW SLAB

DETAIL 6: TYPICAL VACUUM MONITORING POINT (SECTION VIEW)
NOT TO SCALE



DETAIL 7: TYPICAL VACUUM BLOWER (SECTION VIEW, A-A')
NOT TO SCALE

VACUUM BLOWER NOTES:

1. THE COMPLETE BLOWER ASSEMBLY INCLUDING BLOWER, MOTOR, BASEPLATE, CONTROL PANEL, REMOTE VISUAL ALARM, VALVES, GAUGES, FILTER, AND FLEXIBLE HOSE SHALL BE PROVIDED BY THE MANUFACTURER.
2. BLOWER ASSEMBLY TO BE INSTALLED SHALL PROVIDE AT CONTINUOUS OPERATION A MINIMUM OF 140 CUBIC FEET PER MINUTE (CFM) FLOW RATE AT 15 INCHES OF WATER COLUMN (INCHES WC) VACUUM AT THE VACUUM BLOWER.
3. BLOWER TO BE INSTALLED SHALL BE THE OBAR GBR76UD (120V) OR APPROVED ALTERNATIVE.
4. THE BLOWER SCHEMATICS ARE SHOWN TO ILLUSTRATE THE REQUIRED COMPONENTS AND THE GENERAL LOCATIONS IN THE PIPE RUN AND SHALL NOT BE CONSIDERED TO BE ACCURATE. THE ACTUAL CONFIGURATION AND DIMENSIONS OF THE BLOWER ASSEMBLY WILL VARY BASED ON MANUFACTURING METHODS AND FIELD CONDITIONS. FINAL DESIGN AND BLOWER SYSTEM SELECTED ARE SUBJECT TO APPROVAL BY THE ENGINEER. PROVIDE ALL BLOWER SPECIFICATIONS AND CUT SHEETS FOR COMMISSION AND/OR CONSTRUCTION MANAGER'S APPROVAL PRIOR TO INSTALLATION.
5. THE BLOWER SHALL BE INSTALLED WITHIN A ROOF ENCLOSURE BY THE BLOWER MANUFACTURER.
6. THE ELECTRICAL PANEL FOR THE BLOWER SHALL INCLUDE AN AUXILIARY CONTACT FOR THE REMOTE ALARM AND WILL BE MOUNTED ON THE EXTERIOR OF THE ROOF ENCLOSURE. THE REMOTE ALARM SHALL BE LOCATED WITHIN THE BUILDING AND SHALL BE EASILY ACCESSIBLE. THE ALARM SHALL CONSIST OF A WARNING LIGHT AND ASSOCIATED RELAYS. THE REMOTE ALARM AND CONTROL PANEL SHALL BE CONFIGURED SUCH THAT IF THE BLOWER STOPS OPERATING, THE REMOTE ALARM WILL BE ACTIVATED. A 120V ELECTRICAL SUPPLY SHALL BE PROVIDED TO THE REMOTE ALARM.
7. THE REMOTE VISUAL ALARM SHALL BE LABELED AS FOLLOWS:
   - SUB-SLAB VAPOR VENTING SYSTEM ALARM
   - BLOWER MALFUNCTION IF LIT
   - SERVICE BLOWER FAN IMMEDIATELY
8. SUPPLY POWER TO BLOWER ASSEMBLY, INCLUDING BLOWER AND REMOTE ALARM, IN ACCORDANCE WITH ELECTRICAL SPECIFICATIONS. THE OBAR GBR76UD (120V) MOTOR REQUIRES A SINGLE PHASE, 50/60 Hz, 2108-132V AC RMS POWER SUPPLY.

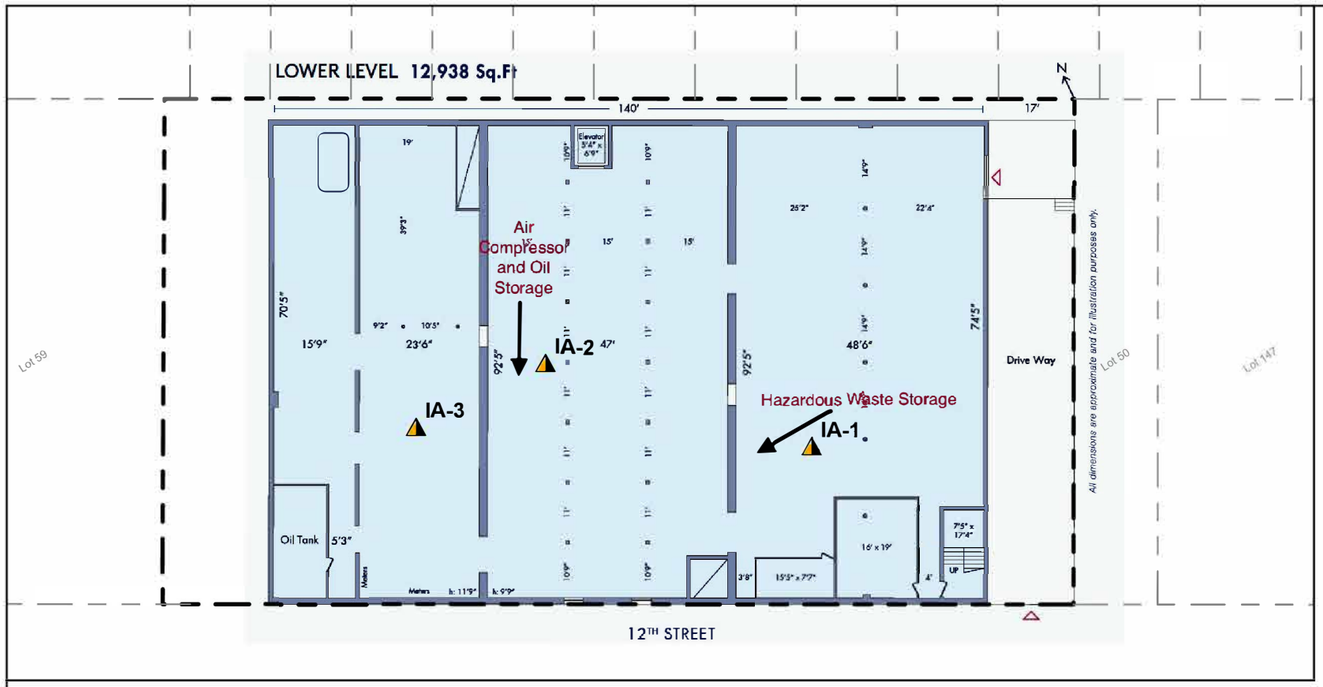
SITE
Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

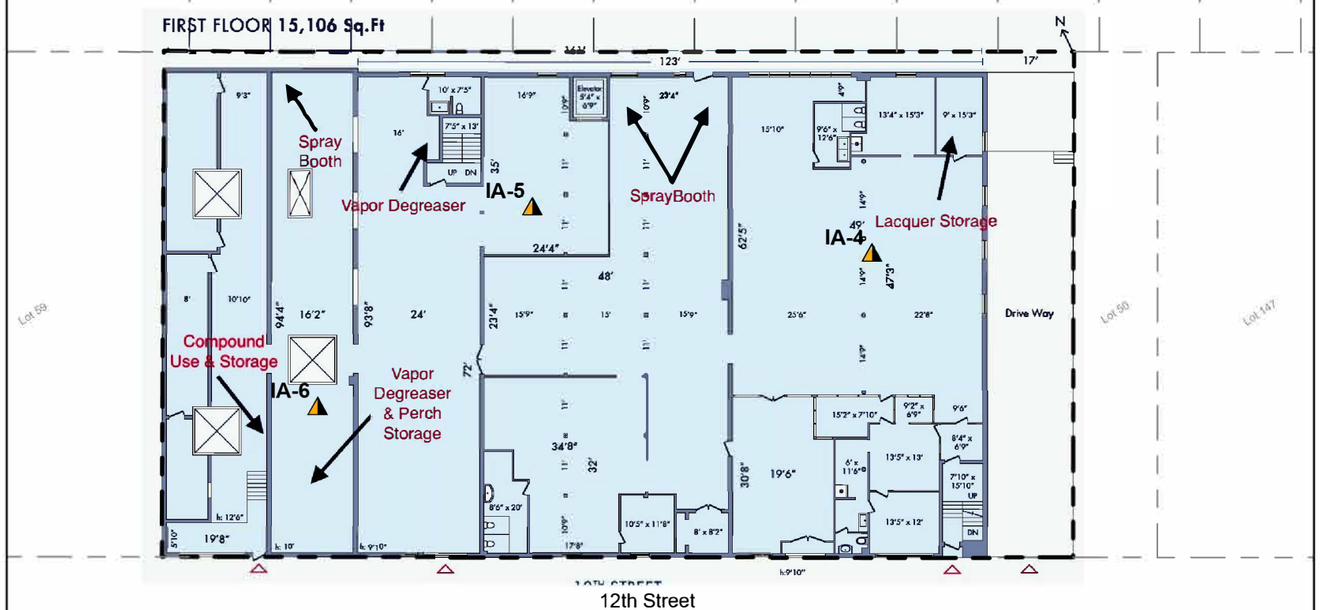
Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

DRAWN BY	CHECKED BY	DATE	SCALE:
LM	MC	May 2025	As Noted

DRAWING TITLE: SSDS and VMP Details

DRAWING NO.: Figure 9





Legend

- Proposed Baseline and Post-Mitigation Indoor Air Sample Location
- NYC Tax Lots
- Site Boundary

0 15 30 60 Feet

Reference:
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

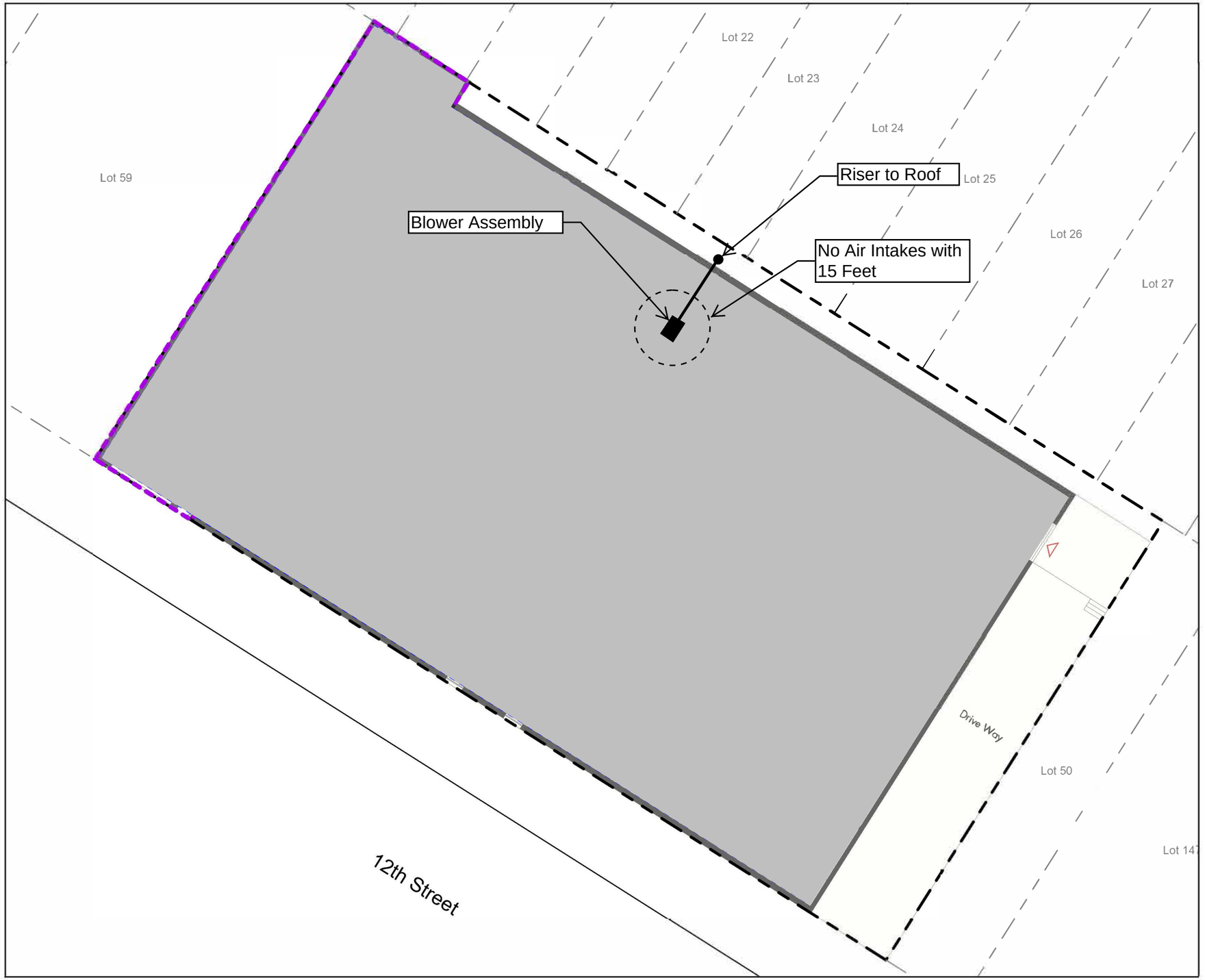
Interim Remedial Measures Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AP	June 2025	As Noted

Drawing Title: Proposed Baseline and Post-Mitigation Indoor Air Sample Locations

Drawing No.: Figure 10



Legend

- NYC Tax Lots
- First Floor Layout
- Site Boundary

Note:
A vapor treatment system will be installed to treat blower effluent prior to exhausting into the atmosphere.

Note:
Piping and Blower Assembly location subject to field conditions.

0 10 20 40 Feet

Reference:
Floor Plan: TERRACRG Commercial Realty Group
Parcel Boundaries: Contributing counties, NYS Office of Information Technology Services GIS Program Office (GPO) and NYS Department of Taxation and Finance's Office of Real Property Tax Services (ORPTS).

STATE OF NEW YORK
MATTHEW M. CARROLL
091629
LICENSED PROFESSIONAL ENGINEER

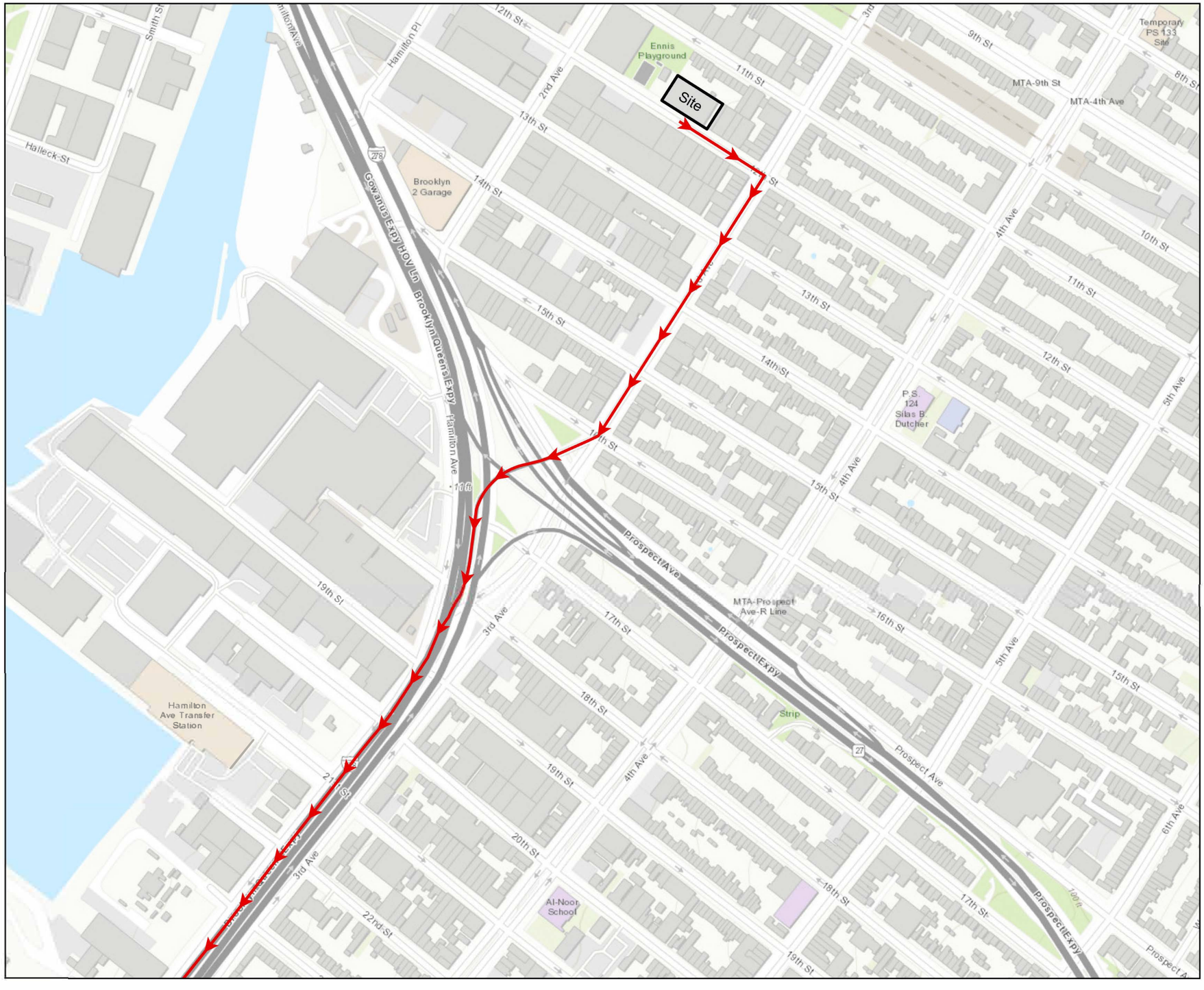
Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	Checked By	Date	Scale
LM	AC	May 2024	As Noted

Drawing Title: SSDS Discharge Location

Drawing No.: Figure 11



Reference: NYC OpenData, State of New Jersey, Esri, HERE, Garmin,

N

W E

S

Legend

Truck Route

Site Bounday

0 175 350 700 Feet

STATE OF NEW YORK
MATTHEW M. CARROLL
091629
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Interim Remedial Measures
Work Plan
127 12th Street
Brooklyn, New York
Block 1020, Lot 52

Matthew M. Carroll, PE
1085 Sackett Avenue
Bronx, NY 10461
NYS PE #091629

Drawn By	LM
Checked By	AP
Date	June 2025
Scale	As Noted

Drawing Title: Truck Route Map

Drawing No.: Figure 12

Tables

Table 1
Project Organization and Site Contact List
127 12th Street - Brooklyn, New York
BCP Site #C224411

Title / Role	Name	Entity	Contact Information
Professional Engineer	Matthew Carroll, PE	--	(917) 510-6767; mcarroll@tenen-env.com
Environmental Consultant QEP	Alana Carroll, PG	Tenen Environmental	(917) 428-2094; acarroll@tenen-env.com
NYSBCP Applicant	Vito Di Maio	Di Maio Enterprises Inc.	(718) 788-1106
Construction Manager	TBD	TBD	TBD
Project Manager	Daniel Nierenberg, PG	NYSDEC	(518) 402-9554; daniel.nierenberg@dec.ny.gov
Project Manager	Aaron Keegan	NYSDOH	(518) 402-7860; beei@health.ny.gov

Table 2
Emergency Contacts
127 12th Street - Brooklyn, New York
BCP Site #C224411

Spill	NYSDEC Spill Hotline	1-800-457-7362
Fire	FDNY	911
Emergency	NYPD	911

Table 3
Interim Remedial Measures Schedule
127 12th Street - Brooklyn, New York
BCP Site #C224411

Task	Duration (working days)	Start	End
IRM WP Submittal		6/27/2025	
NYSDEC/NYSDOH Completeness Review	10	6/27/2025	7/7/2025
NYSDEC Approval of IRM Work Plan	5	7/7/2025	7/12/2025
Pre-Construction Meeting	1	7/13/2025	
Implement Pilot Test and Prepare Design Document	10	7/14/2025	7/24/2025
NYSDEC/NYSDOH Review and Approval of Design Document	10	7/24/2025	8/3/2025
Baseline Indoor Air Sampling	1	8/4/2025	
Install SSDS	15	8/5/2025	8/20/2025
Start-up Testing	5	8/20/2025	8/25/2025
Post Start-up Indoor Air Sampling	1	9/24/2025	
Prepare IRM Construction Completion Report and Interim Site Management Plan	30	9/24/2025	10/24/2025
Heating Season Indoor Air Sampling	1	11/20/2025	

Appendix A
Health and Safety Plan (HASP)

Health and Safety Plan

for
127 12th Street
Interim Remedial Measures Work Plan

127 12th Street
Brooklyn, New York
Block 1220, Lot 52
BCP Site No. C224411

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233

Prepared for:
Di Maio Enterprises Inc.
127 12th Street
Brooklyn, NY 11215

Prepared by:
Matthew M. Carroll, P.E.
1085 Sackett Avenue
Bronx, NY 10461

June 2025

TABLE OF CONTENTS

Figures

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Appendices

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared in conformance with the Occupational Safety and Health Administration (OSHA) standards and guidance that govern site investigation activities, other applicable regulations, and Matthew M. Carroll, PE, health and safety policies and procedures. The purpose of this HASP is the protection of field personnel and others during the implementation of an Interim Remedial Measures Work Plan (IRM WP).

The Site, located at 127 12th Street, Brooklyn, New York (Tax Block 1020, Lot 52), is a rectangular shaped parcel located midblock on the eastern side 12th Street. The Site is bound by 3rd Avenue to the south, 2nd Avenue to the north and 11th Street to the east. The Site is approximately 17,500 square feet (SF) and has approximately 175 feet of frontage along 12th Street. The Site is currently improved with a two-story masonry building with a cellar. The cellar level of the building does not extend fully to the western Site boundary, while the upper level of the building fully extends to the western Site boundary. The Site building houses one commercial space with an area of approximately 25,334 SF. The building is currently utilized for chemical works and dye manufacturing and operates consistent with RCRA requirements. The building footprint comprises approximately 85% of the total Site area with 154 feet of frontage along 12th Street and a depth of 96 feet. The remainder of the Site is paved and used for parking or storage.

The Site lot is zoned M2-1 denoting light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. M2-1 districts are often characterized by one- or two-story warehouses with loading bays and are often buffers between M2 or M3 districts and adjacent residential or commercial districts. Offices, hotels and most retail uses are also permitted under this zoning designation. The area surrounding the Site consists of industrial/manufacturing to the east and south, residential to the north and open space and outdoor recreation to the east.

1.1 Scope of HASP

This HASP includes safety procedures to be used by staff during the following activities:

- Installation of sub-slab depressurization system (SSDS).

Subcontractors will ensure that performance of the work is in compliance with this HASP and applicable laws and regulations.

2.0 PROJECT SAFETY AUTHORITY

The following personnel are responsible for project health and safety under this HASP.

- Project Manager, Alana Carroll
- Health and Safety Officer (HSO), Ashley Platt

In addition, each individual working at the Site will be responsible for compliance with this HASP and general safe working practices. All Site workers will have the authority to stop work if a potentially hazardous situation or event is observed.

2.1 Designated Personnel

The Project Manager is responsible for the overall operation of the project, including compliance with the HASP and general safe work practices. The Project Manager may also act as the Health and Safety Officer (HSO) for this project.

On-site personnel will be appointed as the on-site HSO. This individual will be responsible for the implementation of the HASP. The HSO will have a 4-year college degree in occupational safety or a related science/engineering field, and at least two (2) years of experience in implementation of air monitoring and hazardous materials sampling programs. The HSO will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards.

The HSO will be present on-site during all field operations involving drilling or other subsurface disturbance and will be responsible for all health and safety activities and the delegation of duties to the field crew. The HSO has stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the HSO must be absent from the field, a replacement who is familiar with the Construction Health and Safety Plan, air monitoring and personnel protective equipment (PPE) will be designated.

3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

The following description of historical Site operations has been provided by others and can be found in many previous reports included as Appendix A. The assumptions and observations provided in the following paragraphs are not those of Matthew M. Carroll, PE.

According to our review of the available Sanborn Fire Insurance Maps, the Site was developed sometime prior to 1886 with multiple dwellings and a chemical works. By 1904, the chemical works had become "city laundry" and the multiple dwellings remained. By 1915, "city laundry" had become "domestic steam laundry" and had expanded their commercial footprint, leaving three of four dwellings remaining. A coat and apron supply company also occupied the Site lot in 1915. By 1938, only one dwelling remained and the majority of the lot was utilized as "domestic steam laundry" with the exception of a small carpenter shop abutting the laundry. By 1950, the remaining dwelling abutting the laundry to the east is no longer depicted and the former carpenter space has been replaced with a dwelling. Between 1950 and 1969 the laundry ceased operations and the space is used for unspecified manufacturing and contains a truck loading area; the dwelling abutting the commercial space to the west is still depicted. By 1977, it appears that the entire Site lot is occupied by the current use operator. The Site lot remains unchanged from this time. City directory listings document historic use of the Site as a metal manufacturer from circa 1960 to 2014, consistent with the current use. Additional listings reviewed include plastics manufacturing, enamel spraying, commercial supermarket and a coffee shop.

Summary

Soil results were compared to NYSDEC Protection of Groundwater (PGW) and Restricted Commercial Use Soil Cleanup Objectives (SCOs) as listed in 6 NYCRR Part 375-6.8(a) and (b) the October 21, 2010 NYSDEC DEC Policy CP-51. SCOs PGW SCOs are used as a screening value for potential groundwater impacts and the RCU SCOs are consistent with the current and assumed future use of the Site.

Soil

Limited Phase II Investigations were completed in 2023 and 2024 by Tenen Environmental, LLC (Tenen). PCE was detected in exceedance of its Protection of Groundwater SCO of 1.3 micrograms per kilogram (mg/kg or ppm) in five soil samples, collected between 1-3 ft-bg and 3-5 ft-bg. Additionally, cis-1,2-DCE and vinyl chloride, breakdown products of PCE, were each detected in one soil sample collected from 3-5 ft-bg exceeding their Protection of Groundwater SCO of 0.25 ppm and 0.02 ppm, respectively. PCE was detected at a max. concentration of 47 ppm; cis-1,2-DCE was detected at a concentration of 2.5 ppm; and, vinyl chloride was detected at a concentration of 0.3 ppm. In general, the highest concentrations of cVOCs in soil were detected in the northern portion of the Site.

One SVOC, the polyaromatic hydrocarbon (PAH) benzo(a)pyrene, was detected in one soil sample collected from 3-5 ft-bg at a concentration exceeding the Restricted-Commercial Use SCO of 1 ppm. Benzo(a)pyrene was detected at a concentration of 3.2 ppm. No other SVOCs were detected in exceedance of RCSCOs in any soil samples.

One metal, arsenic, was detected in one soil sample collected from 0-2 ft-bg at a concentration exceeding the Restricted-Commercial SCO of 16 ppm. Arsenic was detected at a concentration of 39 ppm. No other metals were detected in exceedance of RCSCOs in any soil samples.

VOCs, pesticides and PCBs were not detected in exceedance of Restricted-Commercial SCOs in any soil samples.

Groundwater

Groundwater results were compared to NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and Guidance Values (Class GA Standards).

The cVOC PCE and its breakdown products trichloroethene (TCE), cis-1,2-DCE, and vinyl chloride were detected in one or more groundwater samples in exceedance of their respective AWQS. PCE was detected in ten groundwater samples exceeding the AWQS of 5 parts-per-billion (ppb) [max. 320 ppb]; TCE was detected in three groundwater samples exceeding the AWQS of 5 ppb [max. 15 ppb]; cis-1,2-DCE was detected in four groundwater samples exceeding the AWQS of 5 ppb [max. 39 ppb]; and, vinyl chloride was detected in one groundwater sample exceeding the AWQS of 2 ppb [concentration of 2.2 ppb]. In general, the highest concentrations of cVOCs in groundwater were detected in the eastern portion of the Site.

One petroleum-related VOC, 1,2,4,5-tetramethylbenzene, was detected in exceedance of its AWQS of 5 ppb in one groundwater sample collected from the northwestern portion of the Site. 1,2,4,5-tetramethylbenzene was detected at a concentration of 15 ppb in temporary well TW-6.

A variety of SVOCs, specifically PAHs, were detected in nominal exceedance of their respective Class GA Standards in groundwater samples across the Site, including benzo(a)anthracene [max. 0.34 ppb], benzo(b)fluoranthene [max. 0.38 ppb], benzo(k)fluoranthene [max. 0.14 ppb], chrysene [max. 0.31 ppb], and indeno(1,2,3-cd)pyrene [max. 0.19 ppb]. All of the aforementioned analytes have an AWQS of 0.002 ppb. No other SVOCs were detected in exceedance of Class GA Standards in any groundwater samples.

A variety of metals were detected in exceedance of Class GA Standards in unfiltered groundwater samples across the Site. Arsenic [concentration of 31.37 ppb with an AWQS of 25 ppb], iron [max. 4,380 ppb with an AWQS of 300 ppb], lead [concentration of 81.82 ppb with an AWQS of 25 ppb], manganese [max. 926.9 ppb with an AWQS of 300 ppb], selenium [concentration of 10.1 ppb with an AWQS of 10 ppb], and sodium [max. 70,900 ppb with an AWQS of 20,000 ppb] were each detected in exceedance of the AWQS in all one or more groundwater samples at the Site. Of these, the naturally-occurring earth metals manganese and sodium were detected in exceedance of the AWQS in filtered groundwater samples across the Site. Filtered manganese was detected at a max. concentration of 1,235 ppb with an AWQS of 300 ppb and sodium was detected at a max. concentration of 89,600 ppb with an AWQS of 20,000 ppb. No other metals were detected in exceedance of the AWQS in any unfiltered or filtered groundwater samples.

Pesticides and PCBs were not detected above the AWQS in any groundwater samples.

Sub-Slab Soil Vapor and Indoor Air

A variety of cVOCs were detected in sub-slab soil vapor across the Site, including PCE [max. 16,100 micrograms per cubic meter (ug/m3)], TCE [max. 537 ug/m3], cis-1,2-DCE [max. 377 ug/m3], methylene chloride [concentration of 23 ug/m3], and chloroform [max. 752 ug/m3]. In general, the highest concentrations of cVOCs were detected in the soil vapor sample collected from the southern portion of the Site basement.

A variety of cVOCs were detected in the indoor air sample collected from the Site basement, including PCE [concentration of 1,270 ug/m3], TCE [concentration of 4.82 ug/m3], cis-1,2-DCE [concentration of 0.349 ug/m3], methylene chloride [concentration of 21.4 ug/m3], and carbon tetrachloride [concentration of 0.459 ug/m3]. Of these, PCE and TCE were detected in the indoor air sample in exceedance of the NYSDOH Air Guideline Values (AGVs) of 30 ug/m3 and 2 ug/m3, respectively.

Co-located sub-slab soil vapor and indoor air samples were not collected as part of the May 2023 Due Diligence investigation. However, based on a comparison of cVOC concentrations in sub-slab soil vapor and indoor air to the applicable NYSDOH Decision Matrices (Matrix B for PCE and methylene chloride, and Matrix A for TCE, cis-1,2-DCE, and carbon tetrachloride), mitigation would be required at all five sub-slab soil vapor sample locations and the indoor air sample location for PCE; mitigation would be

required at two sub-slab soil vapor sample locations and the indoor air sample location for TCE; mitigation would be required at one sub-slab soil vapor sample location for cis-1,2-DCE; and, mitigation would be required at the indoor air sample location for methylene chloride regardless of the potential co-located sub-slab soil vapor or co-located indoor air concentrations at these locations.

A variety of petroleum-related VOCs were detected at low concentrations in sub-slab soil vapor and indoor air across the Site, including benzene [concentration of 0.68 ug/m3 in indoor air], toluene [max. 32.3 ug/m3 in sub-slab soil vapor and concentration of 8.55 ug/m3 in indoor air], ethylbenzene [concentration of 1.55 ug/m3 in indoor air], p/m-xylene [concentration of 22.5 ug/m3 in sub-slab soil vapor and 5.34 ug/m3 in indoor air], o-xylene [concentration of 1.52 ug/m3 in indoor air], 1,2,4-trimethylbenzene [concentration of 1.62 ug/m3 in indoor air], and 4-methyl-2-pentanone [concentration of 12.5 ug/m3 in indoor air]. None of these compounds require mitigation based on NYSDOH Decision Matrix D.

3.1 Human Exposure Pathways

The media of concern at the Site include potentially-impacted soil, groundwater and soil vapor. Potential exposure pathways include dermal contact, incidental ingestion and inhalation of vapors. The risk of dermal contact and incidental ingestion will be minimized through general safe work practices, a personal hygiene program and the use of PPE. The risk of inhalation will be minimized through the use of an air monitoring program for VOCs and particulates.

3.2 Chemical Hazards

Based on historic uses, the following contaminants of concern may be present at the Site:

VOCs
- 1,2,4,5-tetramethylbenzene
- Chlorinated Solvents
  - PCE
  - TCE
  - Cis-1,2-DCE
  - Vinyl Chloride

PAHs
- benzo(a)pyrene
- benzo(a)anthracene
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- chrysene
- indeno(1,2,3-cd)pyrene

Metals
- arsenic
- iron
- lead
- manganese
- mercury
- selenium
- sodium

Material Safety Data Sheets (MSDSs) for each contaminant of concern are included in Appendix C. All personnel are required to review the MSDSs included in this HASP.

3.3 Physical Hazards

The physical hazards associated with the field activities likely present a greater risk of injury than the chemical constituents at the Site. Activities within the scope of this project shall comply with New York State and Federal OSHA construction safety standards.

Head Trauma
To minimize the potential for head injuries, field personnel will be required to wear National Institutes of Occupational Safety and Health (NIOSH)-approved hard hats during field activities. Hats must be worn properly and not altered in any way that would decrease the degree of protection provided.

Foot Trauma
To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed. To afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

Eye Trauma
Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed to prevent eye injuries caused by contact with chemical or physical agents.

Noise Exposure
Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed.

Buried Utilities and Overhead Power Lines
Boring locations will be cleared by an underground utility locator service. In addition, prior to intrusive activities, the drilling subcontractor will contact the One Call Center to arrange for a utility mark-out, in accordance with New York State requirements. Protection from overhead power lines will be accomplished by maintaining safe distances of at least 15 feet at all times.

Thermal Stress
The effects of ambient temperature can cause physical discomfort, personal injury, and increase the probability of accidents. In addition, heat stress due to lack of body ventilation caused by protective clothing is an important consideration. Heat-related illnesses commonly consist of heat stroke and heat exhaustion.

The symptoms of heat stroke include: sudden onset; change in behavior; confusion; dry, hot and flushed skin; dilated pupils; fast pulse rate; body temperature reaching 105° or more; and/or, deep breathing later followed by shallow breathing.

The symptoms of heat exhaustion include: weak pulse; general weakness and fatigue; rapid shallow breathing; cold, pale and clammy skin; nausea or headache; profuse perspiration; unconsciousness; and/or, appearance of having fainted.

Heat-stress monitoring will be conducted if air temperatures exceed 70 degrees Fahrenheit. The initial work period will be set at 2 hours. Each worker will check his/her pulse at the wrist for 30 seconds early in each rest period. If the pulse rate exceeds 110 beats per minute, the next work period will be shortened by one-third.

One or more of the following precautions will reduce the risk of heat stress on the Site:

- Provide plenty of liquids to replace lost body fluids; water, electrolytic drinks, or both will be made available to minimize the risk of dehydration and heat stress
- Establish a work schedule that will provide appropriate rest periods
- Establish work regimens consistent with the American Conference of Governmental Industrial Hygienists (ACGIH) guidelines
- Provide adequate employee training on the causes of heat stress and preventive measures

In the highly unlikely event of extreme low temperatures, reasonable precautions will be made to avoid risks associated with low temperature exposure.

Traffic

Field activities will occur near public roadways. As a result, vehicular traffic will be a potential hazard during these activities and control of these areas will be established using barricades or traffic cones. Additional staff will be assigned, as warranted, for the sole purpose of coordinating traffic. Personnel will also be required to wear high-visibility traffic vests while working in the vicinity of the public roadways and local requirements for lane closure will be observed as needed. All work in public rights-of-way will be coordinated with local authorities and will adhere to their requirements for working in traffic zones.

Hazardous Weather Conditions

All Site workers will be made aware of hazardous weather conditions, specifically including extreme heat, and will be requested to take the precautions described herein to avoid adverse health risks. All workers are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain or high wind, sleet, snow or freezing.

Slip, Trip and Fall

Areas at the Site may be slippery from mud or water. Care should be taken by all Site workers to avoid slip, trip, and fall hazards. Workers shall not enter areas that do not have adequate lighting. Additional portable lighting will be provided at the discretion of the HSO.

Biological Hazards

Drugs and alcohol are prohibited from the Site. Any on-site personnel violating this requirement will be immediately expelled from the site.

Any worker or oversight personnel with a medical condition that may require attention must inform the HSO of such condition. The HSO will describe appropriate measures to be taken if the individual should become symptomatic.

Due to the Site location in an urban area, it is highly unlikely that poisonous snakes, spiders, plants and insects will be encountered. However, other animals (dogs, cats, etc.) may be encountered and care should be taken to avoid contact.

4.0 COVID-19 HEALTH AND SAFETY

The following requirements apply to all employees working on project sites for the duration of the COVID-19 pandemic. These guidelines are based on information provided by the Centers for Disease Control, the Occupational Safety and Health Administration and the New York State "New York Forward" Covid-19 management plans. Information regarding the health status of employees will be kept confidential, with the exception of required notifications to health authorities. The following are guidelines. **As with any potential workplace hazard, employees should report any concerns related to potential Covid-19 exposure to the Project Manager.**

Communication/Reporting:

Employees should not report to work and should notify the Project Manager immediately in the event of the following:

- You are exhibiting flu-like symptoms (fever, body aches, cough, difficulty breathing). Contact your health care provider and follow their instructions.
- You do not exhibit symptoms but have a sick (i.e., diagnosed with Covid-19 or exhibiting flu-like symptoms) family member at home. Remember that the virus can be spread by asymptomatic individuals.
- You have been exposed to someone who has been diagnosed with Covid-19.

In each of the above cases, inform your Project Manager regarding others who may have been exposed in order to facilitate any necessary notification or contact tracing efforts.

Hygiene

- Wash hands frequently with soap and water for at least 20 seconds or use hand sanitizer with at least 60% alcohol if soap and water are not available. Key times for employees to clean their hands include:
    - Before and after work shifts
    - Before and after work breaks
    - After blowing the nose, coughing, or sneezing
    - After using the restroom
    - Before eating or preparing food
    - After putting on, touching, or removing face coverings
- Avoid touching the eyes, nose, and mouth with unwashed hands.
- Practice good respiratory etiquette, including covering coughs and sneezes.
- To the extent possible, avoid sharing tools and sampling equipment. Shared tools and equipment should be regularly disinfected.

Physical Distancing

- Minimize contact with others, maintaining a distance of at least six feet to the extent possible
- Employees should wear masks over their nose and mouth to prevent spread of the virus; this is especially important when a minimum 6-foot distance cannot be maintained.
- Maintain the 6-foot distance to the extent possible during sampling efforts and pickup and delivery of sampling equipment and containers.

- Keep job site meetings to a minimum and of short duration; limit the number of people involved and maintain social distance.

5.0 AIR MONITORING

The NYSDOH Generic Community Air Monitoring Plan (CAMP), included as Appendix 1A of DER-10, will be implemented during all ground-intrusive sampling activities. In addition, provisions for work within proximity of potential receptors is also included.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring should be performed using equipment appropriate for the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment 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. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls

are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative- pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors.

Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Occupied Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protection equipment required for various kinds of site investigation tasks is based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, "General Description and Discussion of the Levels of Protection and Protective Gear" and the Centers for CDC COVID-19 "Guidelines on How to Protect Yourselves and Others".

Field personnel and other site personnel will wear Modified Level D-1 personal protective equipment. During activities such as drilling, well installation, or sampling, where there is a chance of contact with contaminated materials, Modified Level D-2 equipment will be worn. The protection will be upgraded to Level C if warranted by the results of the air monitoring. A six-foot minimum distance between individuals (both workers and non-workers) will be maintained at all times. A description of the personnel protective equipment for Levels D and C is provided below.

Modified Level D-1
Respiratory Protection: Cloth face covering
Protective Clothing: Hard hat, steel or composite-toed shoes, long pants, nitrile gloves

Modified Level D-2
Respiratory Protection: Cloth face covering
Protective Clothing: Hard hat, steel or composite-toed shoes, coveralls/tyvek, nitrile gloves

Level C
Respiratory Protection: Air purifying respirator with organic vapor cartridges and filters.
Protective Clothing: Same as Modified Level D-2

7.0 EXPOSURE MONITORING

7.1 Hazardous Materials

Selective monitoring of workers in the exclusion area may be conducted, as determined by the HSO, if sources of hazardous materials are identified. Personal monitoring may be conducted in the breathing zone at the discretion of the Project Manager or HSO. All monitoring will comply with the CDCs Guidance on Social Distancing.

7.2 COVID-19

For any employee that may have come into contact with a person who has COVID-19, a 5-day quarantine will be imposed for that individual and any employee that individual was in contact with.

8.0 SITE ACCESS

Access to the Site during the investigation will be controlled by the Project Manager or HSO. Unauthorized personnel will not be allowed access to the sampling areas.

9.0 WORK AREAS

During any activities involving drilling or other subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, clarify the type of protective equipment needed, and provide an area for decontamination.

The Exclusion Zone is defined as the area where potentially contaminated materials are generated as the result of drilling, sampling, or similar activities. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located adjacent to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a field phone, fire extinguisher and/or first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all Site workers will assemble in the event of an emergency. These zones shall be designated daily, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Control measures such as "Caution" tape and traffic cones will be placed around the perimeter of the work area when work is being done in the areas of concern (i.e., areas with exposed soil) to prevent unnecessary access.

10.0 DECONTAMINATION PROCEDURES

Personnel Decontamination
Personnel decontamination (decon), if deemed necessary by the HSO, will take place in the designated decontamination area delineated for each sampling location. Personnel decontamination will consist of the following steps:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal;
- Disposable clothing removal; and
- Field wash of hands and face.

Equipment Decontamination
Sampling equipment, such as split-spoons and bailers, will be decontaminated in accordance with U.S. Environmental Protection Agency methodologies, as described in the work plan.

Disposal of Materials
Purged well water, water used to decontaminate any equipment and well cuttings will be containerized and disposed off-site in accordance with federal, state and local regulations.

11.0 GENERAL SAFE WORK PRACTICES

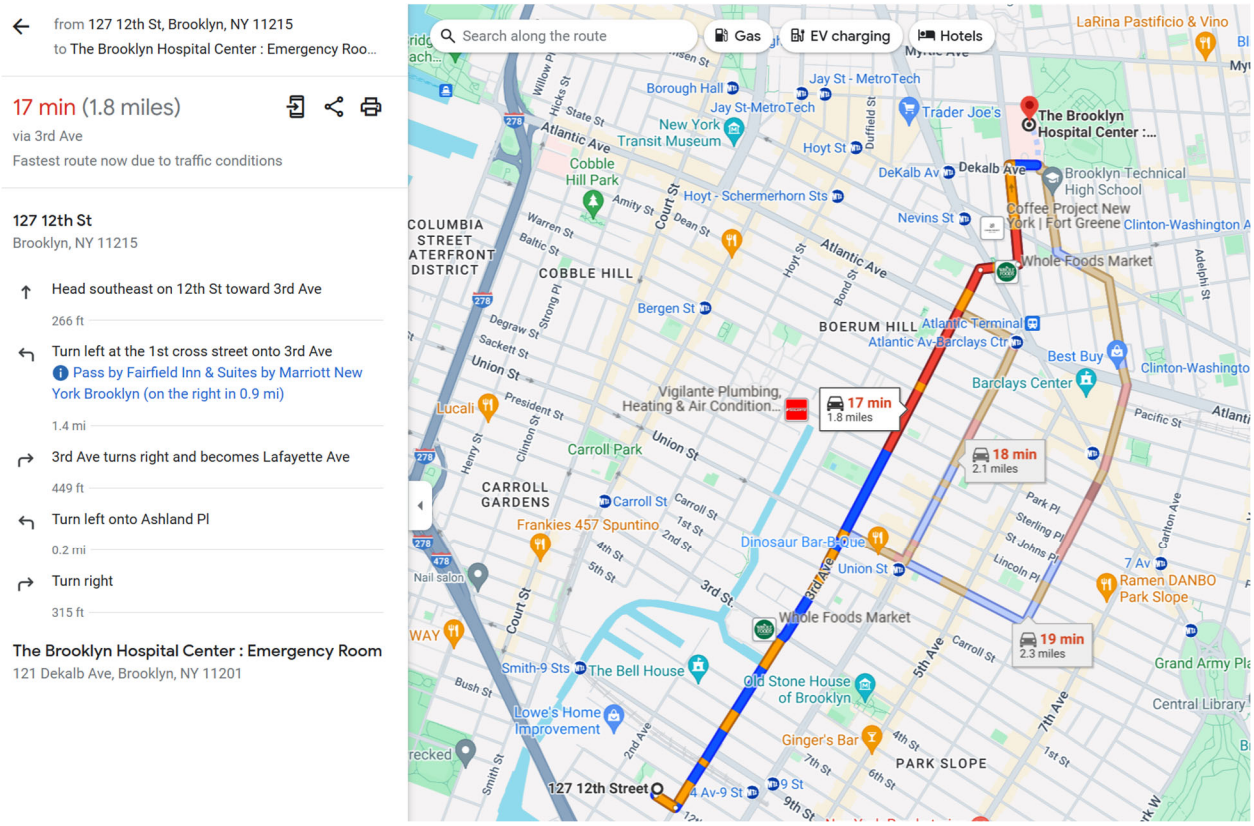
To protect the health and safety of the field personnel, all field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the HSO.
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity. The workers should shower as soon as possible after leaving the site.
- Removal of potential contamination from PPE and equipment by blowing, shaking or any means that may disperse materials into the air is prohibited.
- Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat stress.
- Personnel will be cautioned to inform each other of symptoms of chemical exposure such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- No excessive facial hair that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

12.0 EMERGENCY PROCEDURES

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the HSO will determine the nature of the emergency and will have someone call for an ambulance, if needed. If the nature of the injury is not serious—i.e., the person can be moved without expert emergency medical personnel—onsite personnel should drive injured person to a hospital. **The nearest emergency room is located at the Brooklyn Hospital Center – 121 Dekalb Avenue, Brooklyn, NY 11201. The phone number is (718) 250-8000.** The route to the hospital is shown and detailed on the next page.

12.1 Route to Hospital



Driving directions to **The Brooklyn Hospital Center: Emergency Room** from **127 12th Street.**

12.2 Emergency Contacts

There will be an on-site field phone. Emergency and contact telephone numbers are listed below:

Table 1 – Emergency Contacts

Ambulance	911
Emergency Room	(718) 250-8000
NYSDEC Spill Hotline	(800) 457-7362
NYSDEC	(518) 402-9554
NYSDOH	(518) 402-7860
Project Manager, Alana Carroll	(917) 428-2094
On-site Personnel, Ashley Platt	(908) 892-1354

13.0 TRAINING

All personnel performing the field activities described in this HASP will have received the initial safety training required by 29 CFR, 1910.120. Current refresher training status also will be required for all personnel engaged in field activities.

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All field personnel must attend a training program covering the following areas:

- potential hazards that may be encountered;
- the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- the purpose and limitations of safety equipment; and
- protocols to enable field personnel to safely avoid or escape from emergencies.

Each member of the field crew will be instructed in the above objectives before he/she goes onto the site. The HSO will be responsible for conducting the training program.

14.0 MEDICAL SURVEILLANCE

All subcontractor personnel performing field work involving drilling or other subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). The medical examination for employees will, at a minimum, be provided annually and upon termination of hazardous waste site work.

Appendix A

Acknowledgement of HASP

ACKNOWLEDGMENT OF HASP

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

AFFIDAVIT

I have read the Construction Health and Safety Plan (HASP) for the 127 12th Street site in Brooklyn, NY. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____
Signature: _____ Date: _____

Appendix B

Injury Reporting Form (OSHA Form 300)

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ____________________

City ________________ State __________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
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					Page totals ➤	__	__	__	__	__	__	__	__	__	__	__	__
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Appendix C

Material Safety Data Sheets (MSDS)

SAFETY DATA SHEET

Creation Date 23-Mar-2012 **Revision Date** 14-Feb-2020 **Revision Number** 2

1. Identification

Product Name **1,2,4,5-Tetramethylbenzene**

Cat No. : **L04493**

CAS-No 95-93-2
Synonyms Durene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Emergency Telephone Number
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660.
After normal business hours, call Carechem 24 at (866) 928-0789.

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid

Precautionary Statements
Prevention
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Wear protective gloves/protective clothing/eye protection/face protection
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
1,2,4,5-Tetramethylbenzene	95-93-2	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention.

Inhalation Remove from exposure, lie down. Remove to fresh air. If not breathing, give artificial respiration. Get medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms and effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Chemical foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media Do not use a solid water stream as it may scatter and spread fire

Flash Point 73 °C / 163.4 °F

Method - No information available

Autoignition Temperature
Explosion Limits
Upper No data available
Lower No data available

Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Do not allow run-off from fire-fighting to enter drains or water courses. Combustible material.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
0	2	0	N/A

6. Accidental release measures

Personal Precautions Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Sweep up and shovel into suitable containers for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Avoid contact with skin and clothing. Avoid breathing vapors or mists. Do not ingest. If swallowed then seek immediate medical assistance. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools. Keep away from open flames, hot surfaces and sources of ignition.

Storage Keep in a dry, cool and well-ventilated place. Refer product specification and/or product label for specific storage temperature requirement. Keep away from heat, sparks and flame. Flammables area. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Beige
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	78 - 82 °C / 172.4 - 179.6 °F
Boiling Point/Range	196 - 197 °C / 384.8 - 386.6 °F
Flash Point	73 °C / 163.4 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	160 mmHg @ 140 °C
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C10 H14
Molecular Weight	134.22

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. Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization No information available.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
1,2,4,5-Tetramethylbenzene	LD50 = 6989 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
1,2,4,5-Tetramethylbenzene	95-93-2	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 None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Very toxic 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
1,2,4,5-Tetramethylbenzene	Not listed	LC50 = 30 mg/L 48h	Not listed	EC50 = 0.47 mg/L 48h

Persistence and Degradability May persist

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

Component	log Pow
1,2,4,5-Tetramethylbenzene	4.17

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 UN1325
Proper Shipping Name Flammable solid, organic, n.o.s.
Hazard Class 4.1
Packing Group II

TDG

UN-No UN1325
Proper Shipping Name Flammable solid, organic, n.o.s.
Hazard Class 4.1
Packing Group II

IATA

UN-No UN1325
Proper Shipping Name Flammable solid, organic, n.o.s.
Hazard Class 4.1

Packing Group II

IMDG/IMO

UN-No UN1325
Proper Shipping Name Flammable solid, organic, n.o.s.
Hazard Class 4.1
Packing Group II

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
1,2,4,5-Tetramethylbenzene	95-93-2	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
1,2,4,5-Tetramethylbenzene	95-93-2	X	-	202-465-7	X	X	X	X	KE-33556

U.S. Federal Regulations

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 Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations Not applicable

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 Moderate risk, Grade 2

16. Other information

Prepared By	Health, Safety and Environmental Department Email: tech@alfa.com www.alfa.com
Creation Date	23-Mar-2012
Revision Date	14-Feb-2020
Print Date	14-Feb-2020
Revision Summary	SDS authoring systems update, replaces ChemGes SDS No. 95-93-2/2.

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

SAFETY DATA SHEET

Revision Date 20-Feb-2020 **Revision Number** 2

1. Identification

Product Name **Arsenic powder**

Cat No. : **10101**

CAS-No 7440-38-2
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Emergency Telephone Number
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660.
After normal business hours, call Carechem 24 at (866) 928-0789.

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 3
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Carcinogenicity	Category 1A

Label Elements

Signal Word
Danger

Hazard Statements
May cause cancer
Toxic if swallowed or if inhaled

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
IF exposed or concerned: Get medical attention/advice
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
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Arsenic	7440-38-2	<=100

4. First-aid measures

General Advice
Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation
Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion
Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects	None reasonably foreseeable.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	approved class D extinguishers. Do not use water or foam.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
arsenic oxides.
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. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	-

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions	Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. Should not be released into the environment.
Methods for Containment and Clean Up	Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling	Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Arsenic	TWA: 0.01 mg/m³	(Vacated) TWA: 0.5 mg/m³	IDLH: 5 mg/m³ Ceiling: 0.002 mg/m³	TWA: 0.01 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection 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.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	No information available
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	817 °C / 1502.6 °F
Boiling Point/Range	614 °C / 1137.2 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	0.01 hPa @ 267 °C
Vapor Density	Not applicable
Specific Gravity	5.778 g/cm3
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	As
Molecular Weight	74.92

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Oxidizing agent

Hazardous Decomposition Products arsenic oxides

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Arsenic	LD50 = 15 mg/kg (Rat) LD50 = 763 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Arsenic	7440-38-2	Group 1	Known	A1	X	A1

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment. May cause long-term adverse effects in the environment. Do not allow material to contaminate ground water system.

Persistence and Degradability Insoluble in water May persist

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1558
Proper Shipping Name	ARSENIC
Hazard Class	6.1
Packing Group	II

TDG

UN-No	UN1558
Proper Shipping Name	ARSENIC
Hazard Class	6.1
Packing Group	II

IATA

UN-No	UN1558
Proper Shipping Name	ARSENIC
Hazard Class	6.1
Packing Group	II

IMDG/IMO

UN-No	UN1558
Proper Shipping Name	ARSENIC
Hazard Class	6.1
Packing Group	II

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
Arsenic	7440-38-2	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
Arsenic	7440-38-2	X	-	231-148-6	X	X	X	X	KE-01933

U.S. Federal Regulations

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Arsenic	7440-38-2	<=100	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Arsenic	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Arsenic	X		-

OSHA - Occupational Safety and Health Administration Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Arsenic	10 µg/m³ TWA 5 µg/m³ Action Level	-

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Arsenic	1 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Arsenic	7440-38-2	Carcinogen	0.06 µg/day 10 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Arsenic	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By	Health, Safety and Environmental Department Email: tech@alfa.com www.alfa.com
Revision Date	20-Feb-2020
Print Date	20-Feb-2020
Revision Summary	SDS authoring systems update, replaces ChemGes SDS No. 7440-38-2/1.

Disclaimer

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End of SDS

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

1,2-DICHLOROETHENE
CAS # 540-59-0, 156-59-2, and 156-60-5

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

HIGHLIGHTS: Exposure to 1,2-dichloroethene occurs mainly in workplaces where it is made or used. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired. *cis*-1,2-Dichloroethene has been found in at least 146 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). *trans*-1,2-Dichloroethene was found in at least 563 NPL sites. 1,2-Dichloroethene was found at 336 sites, but the isomer (*cis*- or *trans*-) was not specified.

What is 1,2-dichloroethene?

(Pronounced 1,2-dī-klôr′ ō-ĕth′ēn)

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. You can smell very small amounts of 1,2-dichloroethene in air (about 17 parts of 1,2-dichloroethene per million parts of air [17 ppm]).

There are two forms of 1,2-dichloroethene; one is called *cis*-1,2-dichloroethene and the other is called *trans*-1,2-dichloroethene. Sometimes both forms are present as a mixture.

What happens to 1,2-dichloroethene when it enters the environment?

- 1,2-Dichloroethene evaporates rapidly into air.
- In the air, it takes about 5-12 days for half of it to break down.
- Most 1,2-dichloroethene in the soil surface or bodies of water will evaporate into air.
- 1,2-Dichloroethene can travel through soil or dissolve in water in the soil. It is possible that it can contaminate groundwater.
- In groundwater, it takes about 13-48 weeks to break down.
- There is a slight chance that 1,2-dichloroethene will break down into vinyl chloride, a different chemical which is believed to be more toxic than 1,2-dichloroethene.

How might I be exposed to 1,2-dichloroethene?

- Breathing 1,2-dichloroethene that has leaked from hazardous waste sites and landfills.
- Drinking contaminated tap water or breathing vapors from contaminated water while cooking, bathing, or washing dishes.
- Breathing 1,2-dichloroethene, touching it, or touching contaminated materials in the workplace.

How can 1,2-dichloroethene affect my health?

Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired; breathing very high levels can kill you.

When animals breathed high levels of *trans*-1,2-dichloroethene for short or longer periods of time, their livers and lungs were damaged and the effects were more severe with longer exposure times. Animals that breathed very high

levels of *trans*-1,2-dichloroethene had damaged hearts.

Animals that ingested extremely high doses of *cis*- or *trans*-1,2-dichloroethene died.

Lower doses of *cis*-1,2-dichloroethene caused effects on the blood, such as decreased numbers of red blood cells, and also effects on the liver.

The long-term (365 days or longer) human health effects after exposure to low concentrations of 1,2-dichloroethene aren't known. One animal study suggested that an exposed fetus may not grow as quickly as one that hasn't been exposed.

Exposure to 1,2-dichloroethene hasn't been shown to affect fertility in people or animals.

How likely is 1,2-dichloroethene to cause cancer?

The EPA has determined that *cis*-1,2-dichloroethene is not classifiable as to its human carcinogenicity.

No EPA cancer classification is available for *trans*-1,2-dichloroethene.

Is there a medical test to show whether I've been exposed to 1,2-dichloroethene?

Tests are available to measure concentrations of the breakdown products of 1,2-dichloroethene in blood, urine, and tissues. However, these tests aren't used routinely to determine whether a person has been exposed to this compound. This is because after you are exposed to 1,2-dichloroethene, the breakdown products in your body that are detected with these tests may be the same as those that come from exposure to other chemicals. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set the maximum allowable level of *cis*-1,2-dichloroethene in drinking water at 0.07 milligrams per liter of water (0.07 mg/L) and *trans*-1,2-dichloroethene at 0.1 mg/L.

The EPA requires that any spills or accidental release of 1,000 pounds or more of 1,2-dichloroethene must be reported to the EPA.

The Occupational Health Safety and Health Administration (OSHA) has set the maximum allowable amount of 1,2-dichloroethene in workroom air during an 8-hour workday in a 40-hour workweek at 200 parts of 1,2-dichloroethene per million parts of air (200 ppm).

Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Fertility: Ability to reproduce.

Ingest: To eat or drink something.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Solvent: A chemical that can dissolve other substances.

References

This ToxFAQs information is taken from the 1996 Toxicological Profile for 1,2-Dichloroethene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

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

SAFETY DATA SHEET

Creation Date 02-Nov-2009 **Revision Date** 13-Oct-2023 **Revision Number** 8

1. Identification

Product Name **Iron, reference standard solution 1000 ppm**

Cat No. : **SI124-100; SI124-500**

Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Thermo Fisher Scientific
Technology Drive , PA 15219 USA
Telephone: 412-770-2326
Fax: 412-770-2224

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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)

Corrosive to metals	Category 1
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
May be corrosive to metals
Causes skin irritation
Causes serious eye damage

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Keep only in original container
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor/physician
Spills
Absorb spillage to prevent material damage
Storage
Store in corrosive resistant polypropylene container with a resistant inliner
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Water	7732-18-5	> 94
Nitric acid …% [C ≤ 70 %]	7697-37-2	< 5
Iron(III) nitrate nonahydrate	7782-61-8	< 1

4. First-aid measures

General Advice If symptoms persist, call a physician.

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. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects Causes eye burns. Causes severe eye damage.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. In the event of fire and/or explosion do not breathe fumes.

Hazardous Combustion Products
Nitrogen oxides (NOx). Thermal decomposition can lead to release of irritating gases and vapors.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Ensure adequate ventilation.
Environmental Precautions	Should not be released into the environment. See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.
Storage.	Keep containers tightly closed in a dry, cool and well-ventilated place. Do not store in metal containers. Corrosives area. Keep in properly labeled containers. Incompatible Materials. Strong oxidizing agents. Strong bases. Metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Nitric acid …% [C ≤ 70 %]	TWA: 2 ppm STEL: 4 ppm	(Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m³ (Vacated) STEL: 4 ppm (Vacated) STEL: 10 mg/m³ TWA: 2 ppm TWA: 5 mg/m³	IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m³ STEL: 4 ppm STEL: 10 mg/m³	TWA: 2 ppm STEL: 4 ppm
Iron(III) nitrate nonahydrate	TWA: 1 mg/m³	(Vacated) TWA: 1 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Tight sealing safety goggles. Face protection shield.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection 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.

Recommended Filter type: Particulates filter conforming to EN 143.

Hygiene Measures Keep away from food, drink and animal feeding stuffs. When using do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes or clothing. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wear suitable gloves and eye/face protection.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear
Odor	Odorless
Odor Threshold	No information available
pH	< 1
Melting Point/Range	> 0 °C / 32 °F
Boiling Point/Range	< 100 °C / 212 °F
Flash Point	Not applicable
Evaporation Rate	> 1 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	14 mmHg
Vapor Density	No information available
Specific Gravity	~ 1.0
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to air or moisture over prolonged periods.

Incompatible Materials Strong oxidizing agents, Strong bases, Metals

Hazardous Decomposition Products Nitrogen oxides (NOx), Thermal decomposition can lead to release of irritating gases and vapors

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Dermal LD50 Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.

Vapor LC50 Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	-	-	-
Nitric acid …% [C ≤ 70 %]	Not listed	Not listed	LC50 = 2500 ppm. (Rat) 1h
Iron(III) nitrate nonahydrate	LD50 = 3250 mg/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Severe eye irritant. Irritating to 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
Water	7732-18-5	Not listed	Not listed	Not listed	Not listed	Not listed
Nitric acid …% [C ≤ 70 %]	7697-37-2	Not listed	Not listed	Not listed	Not listed	Not listed
Iron(III) nitrate nonahydrate	7782-61-8	Not listed	Not listed	Not listed	Not listed	Not listed

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. .

Persistence and Degradability Miscible with water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Nitric acid …% [C ≤ 70 %]	-2.3

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 UN3264
Proper Shipping Name Corrosive liquid, acidic, inorganic, n.o.s.
Technical Name (NITRIC ACID)
Hazard Class 8
Packing Group III

TDG

UN-No UN3264
Proper Shipping Name Corrosive liquid, acidic, inorganic, n.o.s.
Hazard Class 8
Packing Group III

IATA

UN-No UN3264
Proper Shipping Name CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S.*
Hazard Class 8
Packing Group III

IMDG/IMO

UN-No UN3264
Proper Shipping Name Corrosive liquid, acidic, inorganic, n.o.s.
Hazard Class 8
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Water	7732-18-5	X	ACTIVE	-
Nitric acid …% [C ≤ 70 %]	7697-37-2	X	ACTIVE	-
Iron(III) nitrate nonahydrate	7782-61-8	-	-	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Water	7732-18-5	X	-	231-791-2	X	X		X	X	KE-35400
Nitric acid …% [C ≤ 70 %]	7697-37-2	X	-	231-714-2	X	X	X	X	X	KE-25911
Iron(III) nitrate nonahydrate	7782-61-8	-	-	-	X	X		X	X	-

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Nitric acid …% [C ≤ 70 %]	7697-37-2	< 5	1.0
Iron(III) nitrate nonahydrate	7782-61-8	< 1	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Nitric acid …% [C ≤ 70 %]	X	1000 lb	-	-

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Nitric acid …% [C ≤ 70 %]	-	TQ: 500 lb

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Nitric acid …% [C ≤ 70 %]	1000 lb	1000 lb

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
Water	-	-	X	-	-
Nitric acid …% [C ≤ 70 %]	X	X	X	X	X
Iron(III) nitrate nonahydrate	-	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product contains the following DHS chemicals:
Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Nitric acid …% [C ≤ 70 %]	Release STQs - 15000lb Theft STQs - 400lb

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Water	7732-18-5	-	-	-
Nitric acid …% [C ≤ 70 %]	7697-37-2	-	Use restricted. See item 75. (see link for restriction details)	-
Iron(III) nitrate nonahydrate	7782-61-8	-	-	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Water	7732-18-5	Listed	Not applicable	Not applicable	Not applicable
Nitric acid …% [C ≤ 70 %]	7697-37-2	Listed	Not applicable	Not applicable	Not applicable
Iron(III) nitrate nonahydrate	7782-61-8	Not applicable	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Water	7732-18-5	Not applicable	Not applicable	Not applicable	Not applicable
Nitric acid …% [C ≤ 70 %]	7697-37-2	Not applicable	Not applicable	Not applicable	Annex I - Y34
Iron(III) nitrate nonahydrate	7782-61-8	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 02-Nov-2009
Revision Date 13-Oct-2023
Print Date 13-Oct-2023
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

SAFETY DATA SHEET

Creation Date 03-Apr-2012 **Revision Date** 09-Feb-2024 **Revision Number** 7

1. Identification

Product Name **Lead**

Cat No. : **AC198110000; AC198110010; AC198110050**

CAS No 7439-92-1
Synonyms Lead metal

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
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: 001-800-227-6701 / **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)

Carcinogenicity	Category 1B
Reproductive Toxicity	Category 1A
Effects on or via lactation	
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Kidney, Central nervous system (CNS), Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
May damage fertility. May damage the unborn child

May cause harm to breast-fed children
Causes damage to organs through prolonged or repeated exposure
May cause cancer

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not breathe dust/fume/gas/mist/vapors/spray
Avoid contact during pregnancy/while nursing
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Response
IF exposed or concerned: Get medical attention/advice
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer and Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Lead powder	7439-92-1	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

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. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Lead. lead oxides.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Avoid dust formation.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Incompatible Materials. Strong acids. Ammonium nitrate: fertilizers capable of self-sustaining decomposition. Peroxides.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Lead powder	TWA: 0.05 mg/m³	TWA: 50 µg/m³	IDLH: 100 mg/m³ TWA: 0.050 mg/m³	TWA: 0.05 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	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.
Recommended Filter type:	Particulates filter conforming to EN 143.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid Powder
Appearance	Grey
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	327.4 °C / 621.3 °F
Boiling Point/Range	1740 °C / 3164 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1.7 mmHg @ 1000 °C
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Pb
Molecular Weight	207.19

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Exposure to air.
Incompatible Materials	Strong acids, Ammonium nitrate: fertilizers capable of self-sustaining decomposition, Peroxides
Hazardous Decomposition Products	Lead, lead oxides
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 No information available

Sensitization May cause sensitization by skin contact

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Lead powder	7439-92-1	Group 2A	Reasonably Anticipated	A3	X	A3

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects Contains a known or suspected reproductive toxin.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure Kidney Central nervous system (CNS) Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea

Lead powder	Not listed	LC50: = 1.32 mg/L, 96h static (Oncorhynchus mykiss) LC50: = 1.17 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: = 0.44 mg/L, 96h semi-static (Cyprinus carpio)	Not listed	EC50: = 600 µg/L, 48h (water flea)

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Technical Name Lead powder
Hazard Class 9
Packing Group III

TDG

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

IATA

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Lead powder	7439-92-1	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

Component	CAS No	**TSCA 12(b)** - Notices of Export
Lead powder	7439-92-1	Section 6

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Lead powder	7439-92-1	X	-	231-100-4	X	X		X	X	KE-21887

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372. Note that PBT chemicals are not eligible for the de minimis exemption. For these chemicals, supplier notification limits are provided.

> 0 % = no low concentration cut-off set, supplier notification limit applies.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
Lead powder	7439-92-1	>95	> 0 %	RT = 100 lb

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Lead powder	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration — Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Lead powder	30 µg/m³ Action Level 50 µg/m³ TWA	-

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
Lead powder	10 lb	-	10 lb 4.54 kg

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Lead powder	7439-92-1	Carcinogen Developmental Female Reproductive Male Reproductive	15 µg/day	Developmental Carcinogen

U.S. State Right-to-Know

Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Lead powder	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
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

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Lead powder	7439-92-1	-	Use restricted. See item 72. (see link for restriction details) Use restricted. See item 30. (see link for restriction details) Use restricted. See item 63. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 231-100-4 - Toxic for reproduction (Article 57c)

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

REACH links
https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Lead powder	7439-92-1	Listed	Not applicable	Not applicable	0.1% (Max. Conc.)

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Lead powder	7439-92-1	Not applicable	Not applicable	Not applicable	Annex I - Y31

16. Other information

Prepared By

Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 03-Apr-2012
Revision Date 09-Feb-2024
Print Date 09-Feb-2024
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

SAFETY DATA SHEET

Creation Date 24-Nov-2010 **Revision Date** 25-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Manganese, powder, -325 mesh**

Cat No. : **AC317440000; AC317440010; AC317442500**

CAS No 7439-96-5
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Serious Eye Damage/Eye Irritation	Category 2

Label Elements

Signal Word
Warning

Hazard Statements
Flammable solid
Causes serious eye irritation

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Wear protective gloves/protective clothing/eye protection/face protection
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Manganese	7439-96-5	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention.

Inhalation Remove from exposure, lie down. Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms and effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits

Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material.

Hazardous Combustion Products
None known.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required.
Environmental Precautions	See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

Handling	Avoid contact with skin and eyes. Do not breathe dust. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools.
Storage.	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat, sparks and flame. Keep under nitrogen. Incompatible Materials. Acids. Bases. Halogens.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Manganese	TWA: 0.02 mg/m³ TWA: 0.1 mg/m³	(Vacated) TWA: 1 mg/m³ Ceiling: 5 mg/m³ (Vacated) STEL: 3 mg/m³ (Vacated) Ceiling: 5 mg/m³	IDLH: 500 mg/m³ TWA: 1 mg/m³ STEL: 3 mg/m³	TWA: 0.2 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark brown
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	1260 °C / 2300 °F
Boiling Point/Range	1900 °C / 3452 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Mn
Molecular Weight	54.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Moisture sensitive.

Conditions to Avoid Incompatible products. Exposure to moisture.

Incompatible Materials Acids, Bases, Halogens

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Manganese	LD50 = 9 g/kg (Rat)	Not listed	LC50 > 5.14 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Manganese	7439-96-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Manganese	Not listed	LC50: > 3.6 mg/L, 96h semi-static (Oncorhynchus mykiss)	Not listed	Not listed

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT
UN-No UN3089
Proper Shipping Name Metal powder, flammable, n.o.s.
Technical Name Manganese
Hazard Class 4.1
Packing Group III

TDG
UN-No UN3089
Proper Shipping Name Metal powder, flammable, n.o.s.
Hazard Class 4.1
Packing Group III

IATA

UN-No	UN3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing Group	III

IMDG/IMO

UN-No	UN3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Manganese	7439-96-5	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Manganese	7439-96-5	X	-	231-105-1	X	X		X	X	KE-22999

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Manganese	7439-96-5	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island

Manganese	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Manganese	7439-96-5	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Manganese	7439-96-5	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 24-Nov-2010
Revision Date 25-Dec-2021
Print Date 25-Dec-2021
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

SAFETY DATA SHEET

Creation Date 20-Aug-2014 **Revision Date** 09-Feb-2024 **Revision Number** 5

1. Identification

Product Name **Mercury (Certified ACS)**

Cat No. : **M141-1LB; M141-6LB**

Synonyms Colloidal mercury; Hydrargyrum; Metallic mercury

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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)

Acute Inhalation Toxicity - Vapors	Category 2
Reproductive Toxicity	Category 1B
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Central nervous system (CNS), Kidney.	

Label Elements

Signal Word
Danger

Hazard Statements
Fatal if inhaled
May damage the unborn child
Causes damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear respiratory protection
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
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
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Mercury	7439-97-6	100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. approved class D extinguishers.

Unsuitable Extinguishing Media Water may be ineffective

Flash Point Not applicable
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Very toxic. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Keep product and empty container away from heat and sources of ignition. Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Mercury oxide. Toxic fumes.
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. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. No special precautions required. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Should not be released into the environment. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Pick up and transfer to properly labelled containers.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area. Keep in a dry place. Keep away from acids. Incompatible Materials. Strong oxidizing agents. Ammonia. Metals. Halogens.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Mercury	TWA: 0.025 mg/m³ Skin	(Vacated) TWA: 0.05 mg/m³ Ceiling: 0.1 mg/m³ (Vacated) STEL: 0.03 mg/m³ Skin (Vacated) Ceiling: 0.1 mg/m³	IDLH: 10 mg/m³ TWA: 0.05 mg/m³ Ceiling: 0.1 mg/m³	TWA: 0.025 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. None under normal use conditions.

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 special protective equipment required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-38.87 °C / -38 °F
Boiling Point/Range	356.72 °C / 674.1 °F
Flash Point	Not applicable
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	0.002 mmHg @ 25 °C
Vapor Density	7.0
Specific Gravity	13.59 (H2O=1)
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	Hg
Molecular Weight	200.59

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat.

Incompatible Materials Strong oxidizing agents, Ammonia, Metals, Halogens

Hazardous Decomposition Products Mercury oxide, Toxic fumes

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Mercury	Not listed	Not listed	LC50 < 27 mg/m³ (Rat) 2 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Mercury	7439-97-6	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects May cause harm to the unborn child.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure Central nervous system (CNS) Kidney

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause long-term adverse effects in the environment. Do not allow material to contaminate ground water system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Mercury	Not listed	0.9 mg/L LC50 96h	Not listed	Not listed

		0.18 mg/L LC50 96h 0.16 mg/L LC50 96h 0.5 mg/L LC50 96h		

Persistence and Degradability Insoluble in water May persist

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Mercury - 7439-97-6	U151	-

14. Transport information

DOT

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Subsidiary Hazard Class	6.1
Packing Group	III

TDG

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Subsidiary Hazard Class	6.1
Packing Group	III

IATA

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Subsidiary Hazard Class	6.1
Packing Group	III

IMDG/IMO

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Mercury	7439-97-6	X	ACTIVE	S;12C

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule.

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export

Component	CAS No	**TSCA 12(b)** - Notices of Export
Mercury	7439-97-6	Section 5

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Mercury	7439-97-6	X	-	231-106-7	X	X		X	X	KE-23117

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372. Note that PBT chemicals are not eligible for the de minimis exemption. For these chemicals, supplier notification limits are provided.

> 0 % = no low concentration cut-off set, supplier notification limit applies.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
Mercury	7439-97-6	100	> 0 %	RT = 10 lb

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Mercury	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
Mercury	1 lb	-	1 lb 0.454 kg

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Mercury	7439-97-6	Developmental	-	Developmental

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Mercury	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
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

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Mercury	7439-97-6	-	Use restricted. See item 18[a]. (see link for restriction details) Use restricted. See item 30. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Mercury	7439-97-6	Listed	Not applicable	Not applicable	0.1% (Max. Conc.)

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Mercury	7439-97-6	Not applicable	Not applicable	X	Annex I - Y29

16. Other information

Prepared By Regulatory Affairs

Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	20-Aug-2014
Revision Date	09-Feb-2024
Print Date	09-Feb-2024
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

Conforms to Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals

SAFETY DATA SHEET

Agilent Technologies

Polynuclear Aromatic Hydrocarbon Standard, Part Number 8500-6035

Section 1. Identification

Product identifier : Polynuclear Aromatic Hydrocarbon Standard, Part Number 8500-6035

Part no. : 8500-6035

Relevant identified uses of the substance or mixture and uses advised against

Material uses : Reagents and Standards for Analytical Chemistry Laboratory Use
1 x 1 ml vial

Supplier/Manufacturer : Agilent Technologies Australia Pty Ltd
679 Springvale Road
Mulgrave
Victoria 3170, Australia
1800 802 402

Emergency telephone number (with hours of operation) : CHEMTREC®: +(61)-290372994

Section 2. Hazard(s) identification

Classification of the substance or mixture

H225	FLAMMABLE LIQUIDS - Category 2
H302	ACUTE TOXICITY (oral) - Category 4
H312	ACUTE TOXICITY (dermal) - Category 4
H332	ACUTE TOXICITY (inhalation) - Category 4
H315	SKIN CORROSION/IRRITATION - Category 2
H319	SERIOUS EYE DAMAGE/EYE IRRITATION - Category 2A
H360	REPRODUCTIVE TOXICITY - Category 1
H336	SPECIFIC TARGET ORGAN TOXICITY - SINGLE EXPOSURE (Narcotic effects) - Category 3
H373	SPECIFIC TARGET ORGAN TOXICITY - REPEATED EXPOSURE - Category 2
H304	ASPIRATION HAZARD - Category 1
H400	SHORT-TERM (ACUTE) AQUATIC HAZARD - Category 1
H410	LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 1

GHS label elements

Hazard pictograms :

Signal word : DANGER

Hazard statements : H225 - Highly flammable liquid and vapour.
H302 + H312 + H332 - Harmful if swallowed, in contact with skin or if inhaled.
H304 - May be fatal if swallowed and enters airways.
H315 - Causes skin irritation.
H319 - Causes serious eye irritation.
H336 - May cause drowsiness or dizziness.
H360 - May damage fertility or the unborn child.
H373 - May cause damage to organs through prolonged or repeated exposure.
H410 - Very toxic to aquatic life with long lasting effects.

Precautionary statements

Section 2. Hazard(s) identification

Prevention : P201 - Obtain special instructions before use.
P281 - Use personal protective equipment as required.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response : P391 - Collect spillage.

Storage : P403 + P235 - Store in a well-ventilated place. Keep cool.

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements

Additional warning phrases : Not applicable.

Other hazards which do not result in classification : None known.

Section 3. Composition and ingredient information

Substance/mixture : Mixture

CAS number/other identifiers

Ingredient name	% (w/w)	CAS number
Acetonitrile	≥30 - ≤60	75-05-8
Acetone	≥10 - ≤30	67-64-1
Toluene	≥10 - ≤26	108-88-3
Fluoranthene	≤0.1	206-44-0

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. If necessary, call a poison center or physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : Harmful in contact with skin. Causes skin irritation.

Ingestion : Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced foetal weight
increase in foetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
irritation
redness
reduced foetal weight
increase in foetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
nausea or vomiting
reduced foetal weight
increase in foetal deaths
skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Firefighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Highly flammable liquid and vapour. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapour/gas is heavier than air and will spread along the ground. Vapours may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. This material is very toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
cyanides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Hazchem code : •3WE

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and material for containment and cleaning up

Methods for cleaning up : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapour or mist. Do not swallow. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidising materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls and personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Acetonitrile	**Safe Work Australia (Australia, 12/2019). Absorbed through skin.** STEL: 101 mg/m³ 15 minutes. STEL: 60 ppm 15 minutes. TWA: 67 mg/m³ 8 hours. TWA: 40 ppm 8 hours.
Acetone	**Safe Work Australia (Australia, 12/2019).** STEL: 2375 mg/m³ 15 minutes. STEL: 1000 ppm 15 minutes. TWA: 1185 mg/m³ 8 hours. TWA: 500 ppm 8 hours.
Toluene	**Safe Work Australia (Australia, 12/2019). Absorbed through skin.** STEL: 574 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 191 mg/m³ 8 hours. TWA: 50 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Section 8. Exposure controls and personal protection

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state : Liquid. [Clear.]

Colour : Clear. / Colourless.

Odour : Ether-like.

Odour threshold : Not available.

pH : Not available.

Melting point/freezing point : -45°C (-49°F)

Boiling point, initial boiling point, and boiling range : 81.6°C (178.9°F)

Flash point : Closed cup: -18 to 23°C (-0.4 to 73.4°F)

Evaporation rate : 5.79 (butyl acetate = 1)

Flammability : Not applicable.

Lower and upper explosion limit/flammability limit : Not available.

Section 9. Physical and chemical properties and safety characteristics

Vapour pressure : 11.6 kPa (87 mm Hg)

Relative vapour density : 1.42 [Air = 1]

Relative density : Not available.

Solubility : Soluble in the following materials: cold water and hot water.

Miscible with water : Yes.

Partition coefficient: n-octanol/water : -0.34

Auto-ignition temperature :

Ingredient name	°C	°F	Method
Acetone	465	869	
Toluene	480	896	

Decomposition temperature : Not available.

Viscosity : Not available.

Particle characteristics

Median particle size : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapour to accumulate in low or confined areas.

Incompatible materials : Reactive or incompatible with the following materials:
oxidising materials
Reactive or incompatible with the following materials: reducing materials, metals, acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Acetonitrile	LC50 Inhalation Vapour	Rat	17100 ppm	4 hours
	LD50 Oral	Rat	2460 mg/kg	-
Acetone	LD50 Oral	Rat	5800 mg/kg	-
Toluene	LC50 Inhalation Vapour	Rat	49 g/m³	4 hours
	LD50 Dermal	Rat	12000 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
Fluoranthene	LD50 Dermal	Rabbit	3180 mg/kg	-
	LD50 Oral	Rat	2 g/kg	-

Irritation/Corrosion

Section 11. Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
Acetonitrile	Eyes - Moderate irritant	Rabbit	-	24 hours 100 uL	-
	Skin - Mild irritant	Rabbit	-	500 mg	-
Acetone	Eyes - Mild irritant	Rabbit	-	10 uL	-
	Eyes - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 mg	-
	Skin - Mild irritant	Rabbit	-	395 mg	-
Toluene	Eyes - Mild irritant	Rabbit	-	0.5 minutes 100 mg	-
	Eyes - Mild irritant	Rabbit	-	870 ug	-
	Skin - Mild irritant	Rabbit	-	435 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Skin - Moderate irritant	Rabbit	-	500 mg	-

Conclusion/Summary

Skin : Repeated exposure may cause skin dryness or cracking.

Sensitisation

Not available.

Mutagenicity

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Acetone	Category 3	-	Narcotic effects
Toluene	Category 3	-	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 2	-	-

Aspiration hazard

Name	Result
Polynuclear Aromatic Hydrocarbon Standard, Part Number 8500-6035	ASPIRATION HAZARD - Category 1
Toluene	ASPIRATION HAZARD - Category 1

Information on likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : Harmful in contact with skin. Causes skin irritation.

Section 11. Toxicological information

Ingestion : Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced foetal weight
increase in foetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
irritation
redness
reduced foetal weight
increase in foetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
nausea or vomiting
reduced foetal weight
increase in foetal deaths
skeletal malformations

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Reproductive toxicity : May damage fertility or the unborn child.

Numerical measures of toxicity

Acute toxicity estimates

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapours) (mg/l)	Inhalation (dusts and mists) (mg/l)
Polynuclear Aromatic Hydrocarbon Standard, Part Number 8500-6035	742.6	1871.1	N/A	18.7	N/A
Acetonitrile	500	1100	N/A	11	N/A
Acetone	5800	20000	N/A	76	N/A
Toluene	636	N/A	N/A	49	N/A
Fluoranthene	2000	3180	N/A	N/A	N/A

Section 11. Toxicological information

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Acetonitrile	Acute IC50 3685000 µg/l Fresh water	Aquatic plants - Lemna minor	96 hours
	Acute LC50 3600000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 1000000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 1000000 µg/l Fresh water	Aquatic plants - Lemna minor	96 hours
	Chronic NOEC 160000 µg/l Fresh water	Daphnia - Daphnia magna	21 days
Acetone	Acute EC50 20.565 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute LC50 4.42589 ml/L Marine water	Crustaceans - Acartia tonsa - Copepodid	48 hours
	Acute LC50 10000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 5600 ppm Fresh water	Fish - Poecilia reticulata	96 hours
	Chronic NOEC 4.95 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Chronic NOEC 0.016 ml/L Fresh water	Crustaceans - Daphniidae	21 days
	Chronic NOEC 0.1 ml/L Fresh water	Daphnia - Daphnia magna - Neonate	21 days
	Chronic NOEC 5 µg/l Marine water	Fish - Gasterosteus aculeatus - Larvae	42 days
Toluene	Acute EC50 >433 ppm Marine water	Algae - Skeletonema costatum	96 hours
	Acute EC50 11600 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus - Adult	48 hours
	Acute EC50 6000 µg/l Fresh water	Daphnia - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	Acute LC50 5500 µg/l Fresh water	Fish - Oncorhynchus kisutch - Fry	96 hours
	Chronic NOEC 0.74 mg/l	Daphnia - Ceriodaphnia dubia	7 days
Fluoranthene	Acute EC50 0.103 ug/ml Marine water	Algae - Phaeodactylum tricornutum	72 hours
	Acute EC50 45 ppm Marine water	Algae - Skeletonema costatum	96 hours
	Acute LC50 5.32 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 1.6 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 0.1 µg/l Marine water	Fish - Pleuronectes americanus	96 hours
	Chronic NOEC 0.05 ug/ml Marine water	Algae - Phaeodactylum tricornutum	72 hours
	Chronic NOEC 95 µg/l Marine water	Aquatic plants - Plantae	72 hours
	Chronic NOEC 1.4 µg/l Fresh water	Daphnia - Daphnia magna	21 days
	Chronic NOEC 1.4 µg/l Fresh water	Fish - Pimephales promelas	32 days

Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
Acetonitrile	OECD 310 Ready Biodegradability - CO2 in Sealed Vessels (Headspace Test)	70 % - Readily - 21 days	-	Activated sludge
Acetone	OECD 301B Ready Biodegradability - CO2 Evolution Test	95 % - Readily - 28 days	-	-

Section 12. Ecological information

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Acetonitrile	-	-	Readily
Acetone	-	-	Readily
Toluene	-	-	Readily
Fluoranthene	-	-	Not readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Polynuclear Aromatic Hydrocarbon Standard, Part Number 8500-6035	-0.34	-	low
Acetonitrile	-0.34	3	low
Acetone	-0.23	3	low
Toluene	2.73	90	low
Fluoranthene	5.16	3630.78	high

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapour from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

ADG / IMDG / IATA : Not regulated as Dangerous Goods according to the ADG Code .

Additional information

Remarks: De minimis quantities

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

Standard for the Uniform Scheduling of Medicines and Poisons

6, 5

Model Work Health and Safety Regulations - Scheduled Substances

No listed substance

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

Australia	:	Not determined.
Canada	:	Not determined.
China	:	Not determined.
Europe	:	All components are listed or exempted.
Japan	:	**Japan inventory (CSCL)**: Not determined. **Japan inventory (ISHL)**: Not determined.
New Zealand	:	All components are listed or exempted.
Philippines	:	Not determined.
Republic of Korea	:	Not determined.
Taiwan	:	All components are listed or exempted.
Thailand	:	Not determined.
Turkey	:	Not determined.
United States	:	Not determined.
Viet Nam	:	All components are listed or exempted.

Section 16. Any other relevant information

History

Date of issue/Date of revision	:	28/10/2021
Date of previous issue	:	01/09/2020
Version	:	9
Key to abbreviations	:	ADG = Australian Dangerous Goods ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) N/A = Not available

Section 16. Any other relevant information

SUSMP = Standard Uniform Schedule of Medicine and Poisons
UN = United Nations

Procedure used to derive the classification

Classification	Justification
FLAMMABLE LIQUIDS - Category 2	On basis of test data
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (dermal) - Category 4	Calculation method
ACUTE TOXICITY (inhalation) - Category 4	Calculation method
SKIN CORROSION/IRRITATION - Category 2	Calculation method
SERIOUS EYE DAMAGE/EYE IRRITATION - Category 2A	Calculation method
REPRODUCTIVE TOXICITY - Category 1	Calculation method
SPECIFIC TARGET ORGAN TOXICITY - SINGLE EXPOSURE (Narcotic effects) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY - REPEATED EXPOSURE - Category 2	Calculation method
ASPIRATION HAZARD - Category 1	Expert judgment
SHORT-TERM (ACUTE) AQUATIC HAZARD - Category 1	Calculation method
LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 1	Calculation method

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

Disclaimer: The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

Tetrachloroethylene - ToxFAQs™

CAS # 127-18-4

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

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing and in the aerospace industry. Exposure to very high concentrations of tetrachloroethylene can cause dizziness headaches, sleepiness, incoordination confusion, nausea, unconsciousness, and even death. Tetrachloroethylene has been found in at least 949 of the 1,854 National Priorities List sites identified by U.S. Environmental Protection Agency (EPA).

What is tetrachloroethylene?

Tetrachloroethylene is a nonflammable colorless liquid. Other names for tetrachloroethylene include perchloroethylene, PCE, perc, tetrachloroethene, and perchlor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part in 1 million parts of air (1 ppm) or more.

Tetrachloroethylene is used as a dry cleaning agent and metal degreasing solvent. It is also used as a starting material (building block) for making other chemicals and is used in some consumer products.

What happens to tetrachloroethylene when it enters the environment?

- Tetrachloroethylene can be released into air, water, and soil at places where it is produced or used.
- Tetrachloroethylene breaks down very slowly in the air and so it can be transported long distances in the air. Half of the amount in the air will degrade in approximately 100 days.
- Tetrachloroethylene evaporates quickly from water into air. It is generally slow to break down in water.
- Tetrachloroethylene may evaporate quickly from shallow soils or may filter through the soil and into the groundwater below. It is generally slow to break down in soil.

How might I be exposed to tetrachloroethylene?

- When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- When you drink water containing tetrachloroethylene, you are exposed to it. You might also be exposed to tetrachloroethylene that is released into the air during showering and bathing.
- People residing near contaminated sites or dry cleaning locations may be exposed to higher levels than the general population.
- People working in the dry cleaning industries or using metal degreasing products may be exposed to elevated levels of tetrachloroethylene.

How can tetrachloroethylene affect my health?

Breathing high levels of tetrachloroethylene for a brief period may cause dizziness or drowsiness, headache, and incoordination; higher levels may cause unconsciousness and even death.

Exposure for longer periods to low levels of tetrachloroethylene may cause changes in mood, memory, attention, reaction time, and vision.

Studies in animals exposed to tetrachloroethylene have shown liver and kidney effects, and changes in brain chemistry, but we do not know what these findings mean for humans.

Tetrachloroethylene

CAS # 127-18-4

How likely is tetrachloroethylene to cause cancer?

Studies in humans suggest that exposure to tetrachloroethylene might lead to a higher risk of getting bladder cancer, multiple myeloma, or non-Hodgkin's lymphoma.

In animals, tetrachloroethylene has been shown to cause cancers of the liver, kidney, and blood system.

The Department of Health and Human Services (DHHS) considers tetrachloroethylene to be reasonably anticipated to be a human carcinogen. EPA considers tetrachloroethylene likely to be carcinogenic to humans by all routes of exposure. The International Agency for Research on Cancer (IARC) considers tetrachloroethylene probably carcinogenic to humans.

How can tetrachloroethylene affect children?

It is not known whether children are more susceptible than adults to the effects of tetrachloroethylene.

A few studies in humans have suggested that exposure to tetrachloroethylene increased the numbers of babies with birth defects, but these studies were not large enough to clearly answer the question. Studies in animals exposed by inhalation or stomach tube have not shown clear evidence of specific birth defects.

How can families reduce the risk of exposure to tetrachloroethylene?

- Tetrachloroethylene has been found in low levels in some food. You can minimize the risk of your family's exposure by peeling and thoroughly washing fruits and vegetables before cooking.
- Use bottled water if you have concerns about the presence of tetrachloroethylene in your tap water. You may also contact local drinking water authorities and follow their advice.
- Prevent children from playing in dirt or eating dirt if you live near a waste site that has tetrachloroethylene.
- Tetrachloroethylene is widely used as a scouring solvent that removes oils from fabrics, as a carrier solvent, as a fabric finish or water repellant, and as a metal degreaser/cleaner. Follow instructions on product labels to minimize exposure to tetrachloroethylene.

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

Tetrachloroethylene and its breakdown products (metabolites) can be measured in blood and urine. However, the detection of tetrachloroethylene or its metabolites cannot predict the kind of health effects that might develop from that exposure. Because tetrachloroethylene and its metabolites leave the body fairly rapidly, the tests need to be conducted within days after exposure.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set an 8-hour time weighted average permissible exposure limit of 100 ppm, an acceptable ceiling exposure limit of 200 ppm, and a maximum peak of 300 ppm (not to be exceeded for more than 5 minutes of any 3-hour period).

The National Institute for Occupational Safety and Health (NIOSH) recommends that workplace exposure to tetrachloroethylene be minimized due to concerns about its carcinogenicity.

Reference

This ToxFAQs™ information is taken from the 2019 Toxicological Profile for Tetrachloroethylene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information?

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

Phone: 1-800-232-4636

ToxFAQs™ on the web: www.atsdr.cdc.gov/ToxFAQs

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

SAFETY DATA SHEET

Revision Date 26-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Selenium**

Cat No. : **AC419270000; AC419271000; AC419275000**

CAS No 7782-49-2
Synonyms None

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
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)

Acute oral toxicity	Category 3
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Specific target organ toxicity - (repeated exposure)	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
May cause damage to organs through prolonged or repeated exposure
Toxic if swallowed or if inhaled

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Response
Get medical attention/advice 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
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
May cause long lasting harmful effects to aquatic life

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Selenium	7782-49-2	> 99.5

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture with air.

Hazardous Combustion Products
None known.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep under nitrogen. Incompatible Materials. Acids. Strong oxidizing agents. Fluorine. oxygen. Metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Selenium	TWA: 0.2 mg/m³	(Vacated) TWA: 0.2 mg/m³	IDLH: 1 mg/m³ TWA: 0.2 mg/m³	TWA: 0.2 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure 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 A NIOSH/MSHA approved air purifying dust or mist respirator or European Standard EN 149.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid Granules
Appearance	Dark grey
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	217 - 222 °C / 422.6 - 431.6 °F
Boiling Point/Range	685 °C / 1265 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 345 °C
Vapor Density	Not applicable
Specific Gravity	4.810
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Se
Molecular Weight	78.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Acids, Strong oxidizing agents, Fluorine, oxygen, Metals

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Selenium	LD50 = 6700 mg/kg (Rat)	Not listed	>5.67 mg/l (Rat) 4hr

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Selenium	7782-49-2	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 None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Selenium	Not listed	LC50: > 100 mg/L, 96h semi-static (Oncorhynchus mykiss)	Not listed	Not listed

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN3283
Hazard Class	6.1
Packing Group	III

TDG

UN-No	UN3283
Hazard Class	6.1
Packing Group	III

IATA

UN-No	UN3283
Proper Shipping Name	SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class	6.1
Packing Group	III

IMDG/IMO

UN-No	UN3283
Proper Shipping Name	SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class	6.1
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Selenium	7782-49-2	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Selenium	7782-49-2	X	-	231-957-4	X	X		X	X	KE-30924

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Selenium	7782-49-2	> 99.5	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Selenium	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Selenium	100 lb	-

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
Selenium	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
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

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Selenium	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Selenium	7782-49-2	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Selenium	7782-49-2	Not applicable	Not applicable	Not applicable	Annex I - Y25

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 26-Dec-2021
Print Date 26-Dec-2021

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

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Sodium Metal**

Cat No. : **S135-1LB; S206-1LB**

Synonyms Natrium.

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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)

Substances/mixtures which, in contact with water, emit flammable gases	Category 1
Skin Corrosion/Irritation	Category 1 B
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
In contact with water releases flammable gases which may ignite spontaneously
Causes severe skin burns and eye damage
May cause respiratory irritation

Precautionary Statements
Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Keep away from any possible contact with water, because of violent reaction and possible flash fire
Handle under inert gas. Protect from moisture
Response
Immediately call a POISON CENTER or doctor/physician
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Brush off loose particles from skin. Immerse in cool water/wrap with wet bandages
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Store in a dry place. Store in a closed container
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Reacts violently with water

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Sodium	7440-23-5	100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required. Keep eye wide open while rinsing.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Call a physician immediately.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Call a physician or poison control center immediately. Do not use mouth-to-mouth method if victim ingested or inhaled

	the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Ingestion	Immediate medical attention is required. Do NOT induce vomiting. Drink plenty of water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects	Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam. approved class D extinguishers.
Unsuitable Extinguishing Media	Water may be ineffective
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	115 °C / 239 °F
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
The product causes burns of eyes, skin and mucous membranes. Reacts violently with water.

Hazardous Combustion Products
Hydrogen.
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. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	2	W

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Evacuate personnel to safe areas. Avoid contact with skin, eyes or clothing. No special precautions required.
Environmental Precautions	Should not be released into the environment. Do not allow material to contaminate ground water system. See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Do not expose spill to water. Pick up and transfer to properly labelled containers.

7. Handling and storage

Handling	Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe dust. Do not ingest. If swallowed then seek immediate medical assistance. Do not allow contact with water.
Storage.	Corrosives area. Keep away from water or moist air. Keep in a dry place. Keep away from acids. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures None under normal use conditions. 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 special protective equipment required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Light grey
Odor	Odorless
Odor Threshold	No information available
pH	
Melting Point/Range	98 °C / 208.4 °F
Boiling Point/Range	883 °C / 1621.4 °F
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 440 °C
Vapor Density	Not applicable
Specific Gravity	0.9684 @ 20°C
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	115 °C / 239 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Na
Molecular Weight	22.99

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions.

Conditions to Avoid Exposure to moist air or water. Exposure to moisture.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Hydrogen

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing. Reacts violently with water.

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 No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Sodium	7440-23-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

.

Persistence and Degradability Insoluble in water

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1428
Proper Shipping Name	SODIUM
Hazard Class	4.3
Packing Group	I

TDG Forbidden

IATA

UN-No	UN1428
Proper Shipping Name	SODIUM
Hazard Class	4.3
Packing Group	I

IMDG/IMO

UN-No	UN1428
Proper Shipping Name	SODIUM
Hazard Class	4.3
Packing Group	I

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Sodium	7440-23-5	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Sodium	7440-23-5	X	-	231-132-9	X	X	X	X	X	KE-31338

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Sodium	X	10 lb	-	-

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Sodium	10 lb	-

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
Sodium	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
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

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Sodium	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Sodium	7440-23-5	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Sodium	7440-23-5	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
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

Trichloroethylene - ToxFAQs™

CAS # 79-01-6

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

HIGHLIGHTS: Trichloroethylene is used as a solvent for cleaning metal parts. Exposure to very high concentrations of trichloroethylene can cause dizziness headaches, sleepiness, incoordination, confusion, nausea, unconsciousness, and even death. Trichloroethylene has been found in at least 1,051 of the 1,854 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene is a colorless, volatile liquid. Liquid trichloroethylene evaporates quickly into the air. It is nonflammable and has a sweet odor.

The two major uses of trichloroethylene are as a solvent to remove grease from metal parts and as a chemical that is used to make other chemicals, especially the refrigerant, HFC-134a.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene can be released to air, water, and soil at places where it is produced or used.
- Trichloroethylene is broken down quickly in air.
- Trichloroethylene breaks down very slowly in soil and water and is removed mostly through evaporation to air.
- It is expected to remain in groundwater for long time since it is not able to evaporate.
- Trichloroethylene does not build up significantly in plants or animals.

How might I be exposed to trichloroethylene?

- Breathing trichloroethylene in contaminated air.
- Drinking contaminated water.
- Workers at facilities using this substance for metal degreasing are exposed to higher levels of trichloroethylene.
- If you live near such a facility or near a hazardous waste site containing trichloroethylene, you may also have higher exposure to this substance.

How can trichloroethylene affect my health?

Trichloroethylene was once used as an anesthetic for surgery. Exposure to moderate amounts of trichloroethylene may cause headaches, dizziness, and sleepiness; large amounts may cause coma and even death. Eating or breathing high levels of trichloroethylene may damage some of the nerves in the face. Exposure to high levels can also result in changes in the rhythm of the heartbeat, liver damage, and evidence of kidney damage. Skin contact with concentrated solutions of trichloroethylene can cause skin rashes. There is some evidence exposure to trichloroethylene in the work place may cause scleroderma (a systemic autoimmune disease) in some people. Some men occupationally-exposed to trichloroethylene and other chemicals showed decreases in sex drive, sperm quality, and reproductive hormone levels.

How likely is trichloroethylene to cause cancer?

There is strong evidence that trichloroethylene can cause kidney cancer in people and some evidence for trichloroethylene-induced liver cancer and malignant lymphoma. Lifetime exposure to trichloroethylene resulted in increased liver cancer in mice and increased kidney cancer and testicular cancer in rats.

The Department of Health and Human Services (DHHS) considers trichloroethylene to be a known human carcinogen. The International Agency for Research on Cancer (IARC) classified trichloroethylene as carcinogenic to humans. The EPA has characterized trichloroethylene as carcinogenic to humans by all routes of exposure.

Trichloroethylene

CAS # 79-01-6

How can trichloroethylene affect children?

It is not known whether children are more susceptible than adults to the effects of trichloroethylene.

Some human studies indicate that trichloroethylene may cause developmental effects such as spontaneous abortion, congenital heart defects, central nervous system defects, and small birth weight. However, these people were exposed to other chemicals as well.

In some animal studies, exposure to trichloroethylene during development caused decreases in body weight, increases in heart defects, changes to the developing nervous system, and effects on the immune system.

How can families reduce the risk of exposure to trichloroethylene?

- Avoid drinking water from sources that are known to be contaminated with trichloroethylene. Use bottled water if you have concerns about the presence of chemicals in your tap water. You may also contact local drinking water authorities and follow their advice.
- Prevent children from playing in dirt or eating dirt if you live near a waste site that has trichloroethylene.
- Trichloroethylene is used in many industrial products. Follow instructions on product labels to minimize exposure to trichloroethylene.

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

Trichloroethylene and its breakdown products (metabolites) can be measured in blood and urine. However, the detection of trichloroethylene or its metabolites cannot predict the kind of health effects that might develop from that exposure. Because trichloroethylene and its metabolites leave the body fairly rapidly, the tests need to be conducted within days after exposure.

Has the federal government made recommendations to protect human health?

The EPA set a maximum contaminant goal (MCL) of 0.005 milligrams per liter (mg/L; 5 ppb) as a national primary drinking standard for trichloroethylene.

The Occupational Safety and Health Administration (OSHA) set a permissible exposure limit (PEL) of 100 ppm for trichloroethylene in air averaged over an 8-hour work day, an acceptable ceiling concentration of 200 ppm provided the 8 hour PEL is not exceeded, and an acceptable maximum peak of 300 ppm for a maximum duration of 5 minutes in any 2 hours.

The National Institute for Occupational Safety and Health (NIOSH) considers trichloroethylene to be a potential occupational carcinogen and established a recommended exposure limit (REL) of 2 ppm (as a 60-minute ceiling) during its use as an anesthetic agent and 25 ppm (as a 10-hour TWA) during all other exposures.

Reference

This ToxFAQs™ information is taken from the 2019 Toxicological Profile for Trichloroethylene produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information?

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

Phone: 1-800-232-4636

ToxFAQs™ on the web: www.atsdr.cdc.gov/ToxFAQs

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

SAFETY DATA SHEET

Version 8.8
Revision Date 08/23/2023
Print Date 12/02/2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Vinyl chloride

Product Number : 387622
Brand : Aldrich
Index-No. : 602-023-00-7
CAS-No. : 75-01-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable gases (Category 1), H220
Gases under pressure (Liquefied gas), H280
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard statement(s)

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Chloroethylene

Formula : C_2H_3Cl
Molecular weight : 62.50 g/mol
CAS-No. : 75-01-4
EC-No. : 200-831-0
Index-No. : 602-023-00-7

Component	Classification	Concentration
Vinyl chloride		
	Flam. Gas 1; Press. Gas Liquefied gas; Carc. 1A; H220, H280, H350	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Pay attention to flashback.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe gas. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Stop flow of gas, move leaking cylinder to open air if without risk.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep locked up or in an area accessible only to qualified or authorized persons. Keep away from combustible materials and sources of ignition.

Contents under pressure. Light sensitive.

Storage class
Storage class (TRGS 510): 2A: Gases

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Vinyl chloride	75-01-4	TWA	1 ppm	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Lung cancer Confirmed human carcinogen		

		STEL	5 ppm	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	1 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	5 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		See 1910.1017		
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/mists are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Liquefied gas Color: colorless
b)	Odor	odorless
c)	Odor Threshold	Not applicable
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -153.8 °C (-244.8 °F) - lit.

f)	Initial boiling point and boiling range	-13.4 °C 7.9 °F - lit.
g)	Flash point	-62 °C (-80 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 29.3 %(V) Lower explosion limit: 3.8 %(V)
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	0.911 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	9.15 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.58 at 22 °C (72 °F) - Bioaccumulation is not expected.
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	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - Rat - 2 h - 390 mg/l - gas

Remarks: (ECHA)
Dermal: 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
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells
Metabolic activation: without metabolic activation
Result: negative
Remarks: (ECHA)
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Test Type: dominant lethal test
Species: Mouse

Application Route: inhalation (gas)

Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Mouse

Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: positive

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

IARC: 1 - Group 1: Carcinogenic to humans (Vinyl chloride)

NTP: Known - Known to be human carcinogen (Vinyl chloride)

OSHA: OSHA specifically regulated carcinogen (Vinyl chloride)

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

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 13 Weeks - NOAEL (No observed adverse effect level) - 30 mg/kg

RTECS: KU9625000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Danio rerio (zebra fish) - 210 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to bacteria	Remarks: (ECHA) (Vinyl chloride)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 16 % - Not readily biodegradable. (OECD Test Guideline 301D)

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. Pressurised gas bottle: dispose of only in empty condition! See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1086 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: VINYL CHLORIDE, STABILIZED

IATA
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
IATA Passenger: Not permitted for transport

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D043 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01
hydroquinone	123-31-9	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.Vinyl chloride	75-01-4	2007-09-28

SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich 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.

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Version: 8.8 Revision Date: 08/23/2023 Print Date: 12/02/2023

Appendix B
Community Air Monitoring Plan (CAMP)

Community Air Monitoring Plan (CAMP)

for
127 12th Street
Remedial Investigation Work Plan

127 12th Street
Brooklyn, New York
BCP Site # C224411

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B
625 Broadway, 12th Floor
Albany, NY 12233-7016

Prepared for:
Di Maio Enterprises Inc.
127 12th Street
Brooklyn, NY 11215

Prepared by:
Matthew M. Carroll, P.E.
1085 Sackett Avenue
Bronx, NY 10461

June 2025

New York State Department of Health Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring.

If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment 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. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

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

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible

dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors.

Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Occupied Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated

above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

Appendix C
Quality Assurance Project Plan (QAPP)

Quality Assurance Project Plan

for
127 12th Street
Interim Remedial Measures Work Plan

127 12th Street
Brooklyn, New York
Block 1020, Lot 52
BCP Site No. C224411

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233

Prepared for:
Di Maio Enterprises Inc.
127 12th Street
Brooklyn, NY 11215

Prepared by:
Matthew M. Carroll, P.E.
1085 Sackett Avenue
Bronx, NY 10461

June 2025

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been developed for the Interim Remedial Measures Work Plan prepared for the 127 12th Street property (the Site).

The Site, located at 127 12th Street, Brooklyn, New York (Tax Block 1020, Lot 52), is a rectangular shaped parcel located midblock on the eastern side 12th Street. The Site is bound by 3rd Avenue to the south, 2nd Avenue to the north and 11th Street to the east. The Site is approximately 17,500 square feet (SF) and has approximately 175 feet of frontage along 12th Street. The Site is currently improved with a two-story masonry building with a cellar. The cellar level of the building does not extend fully to the western Site boundary, while the upper level of the building fully extends to the western Site boundary. The Site building houses one commercial space with an area of approximately 25,334 SF. The building is currently utilized for chemical works and dye manufacturing and operates consistent with RCRA requirements. The building footprint comprises approximately 85% of the total Site area with 154 feet of frontage along 12th Street and a depth of 96 feet. The remainder of the Site is paved and used for parking or storage.

The Site lot is zoned M2-1 denoting light industrial uses, such as woodworking shops, repair shops, and wholesale service and storage facilities. M2-1 districts are often characterized by one- or two-story warehouses with loading bays and are often buffers between M2 or M3 districts and adjacent residential or commercial districts. Offices, hotels and most retail uses are also permitted under this zoning designation. The area surrounding the Site consists of industrial/manufacturing to the east and south, residential to the north and open space and outdoor recreation to the east.

1.1 Project Scope and QAPP Objective

The proposed scope of work includes the following:

- Collection of baseline and post-remedial indoor air samples.

The objective of the QAPP is to detail the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of the Focused Remedial Investigation Work Plan. This QAPP addresses how the acquisition and handling of samples and the review and reporting of data will be documented for quality control (QC) purposes. Specifically, this QAPP addresses the following:

- The procedures to be used to collect, preserve, package, and transport samples;
- Field data collection and record keeping;
- Data management;
- Chain-of-custody procedures; and,
- Determination of precision, accuracy, completeness, representativeness, decision rules, comparability and level of quality control effort.

2.0 PROJECT ORGANIZATION

The personnel detailed are responsible for the implementation of the QAPP. Matthew M. Carroll, PE will implement the Interim Remedial Measures Work Plan on behalf of Cameo Metal Products, Inc. once it has been approved by the New York State Department of Environmental Conservation (NYSDEC).

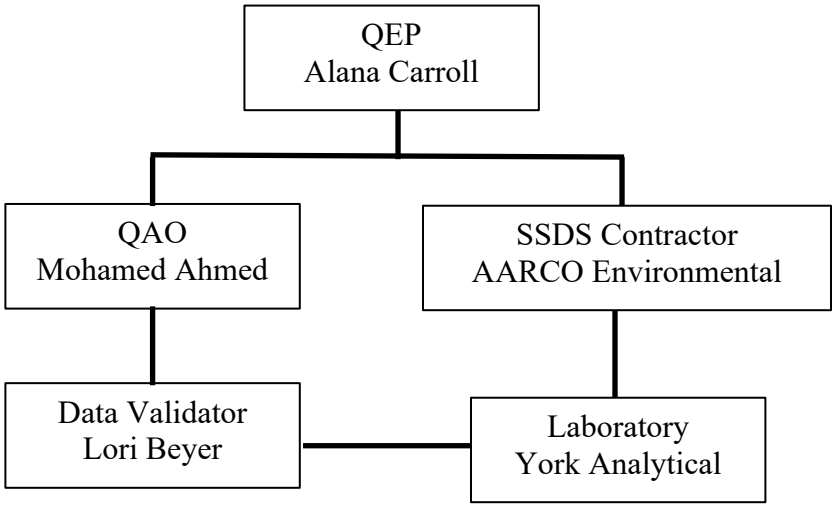
The Project Manager and Qualified Environmental Professional (QEP) will be Mrs. Alana Carroll, CPG, managing geologist at Tenen Environmental, LLC (Tenen). Mrs. Carroll is a certified professional geologist with experience in all aspects of site assessment, development and implementation of remedial strategies. Her experience involves projects from inception through investigation, remediation and closure. Her expertise includes soil, soil vapor and groundwater remediation; remedial selection and design; field/health and safety oversight and preparation of work plans and reports to satisfy the requirements of various regulatory agencies. Mrs. Carroll received her BS in Geology from Hofstra University; her resume is included in Appendix A.

The Quality Assurance Officer will be Mohamed Ahmed, Ph.D., CPG, principal at Tenen. Dr. Ahmed is a certified professional geologist with over 20 years of experience in the New York City metropolitan area. He has designed and implemented subsurface investigations and is proficient in groundwater modeling, design of groundwater treatment systems, and soil remediation. He has managed numerous projects focused on compliance with the requirements of the New York State Brownfield Cleanup Program and spills programs and the New York City E-designation program. Dr. Ahmed also has extensive experience in conducting regulatory negotiations with the New York State Department of Environmental Conservation, the New York City Department of Environmental Protection, the NYC Office of Housing Preservation and Development, and the Mayor's Office of Environmental Remediation. Dr. Ahmed holds advanced degrees in geology and Earth and Environmental Sciences from Brooklyn College and the Graduate Center of the City University of New York; his resume is included in Appendix A.

In addition, Matthew M. Carroll, PE will utilize subcontractors for SSDS installation (AARCO Environmental Services of Lindenhurst, NY), laboratory services (York Analytical Laboratories of Richmond Hill, NY) and data validation (L.A.B. Validation Corp. of East Northport, NY). The resume for the DUSR preparer, Ms. Lori Beyer, is included in Appendix A.

Contact Information:
Di Maio Enterprises Inc., Vito Di Maio, (718) 788-1106
Tenen Environmental, Alana Carroll or Mohamed Ahmed, (646) 606-2332

An organization chart for the implementation of the Interim Remedial Measures Work Plan and QAPP is below.



3.0 SAMPLING AND DECONTAMINATION PROCEDURES

A detailed description of the procedures to be used during this program for collection of the indoor air samples is provided below. An Analytical Methods/Quality Assurance Summary is provided in Table 1, included in Section 3.8.

3.1 Level of Effort for QC Samples

Field blank, trip blank, field duplicate and matrix spike (MS) / matrix spike duplicate (MSD) samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs. Each type of QC sample is discussed below.

- Field and trip blanks consisting of distilled water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field-sampling program. Field (equipment) blank samples are analyzed to check for procedural chemical constituents that may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

- Duplicate samples are analyzed to check for sampling and analytical reproducibility.

- MS/MSD samples provide information about the effect of the sample matrix on the digestion and measurement methodology.

The general level of QC effort will be one field duplicate and one field blank (when non-dedicated equipment is used) for every 20 or fewer investigative samples of a given matrix. Additional sample volume will also be provided to the laboratory to allow one site-specific MS/MSD for every 20 or fewer investigative samples of a given matrix. One trip blank will be included along with each sample delivery group of volatile organic compound (VOC) samples.

The analytical laboratory, York Analytical Laboratories, is certified under the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) as Lab IDs 10854 and 12058. NYSDEC Analytical Services Protocol (ASP) Category B deliverables will be prepared by the laboratory.

3.2 Sample Handling

Samples will either be picked up by the laboratory, delivered to the laboratory in person by the sampler, or transported to the laboratory by overnight courier. All samples will be shipped to the laboratory to arrive within 48 hours after collection, and the laboratory will adhere to the analytical holding times for these analyses, as listed in the current version of the New York State ASP.

3.3 Custody Procedures

Sample custody will be controlled and maintained through the chain-of-custody procedures. The

chain of custody is the means by which the possession and handling of samples is tracked from the site to the laboratory. Sample containers will be cleaned and preserved at the laboratory before shipment to the Site. The following sections (Sections 3.4 and 3.5) describe procedures for maintaining sample custody from the time samples are collected to the time they are received by the analytical laboratory.

3.4 Sample Storage

Samples will be stored in secure limited-access areas. Walk-in coolers or refrigerators will be maintained at 4°C, +/- 2°C, or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored and recorded a minimum of once per day. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location, if necessary.

3.5 Sample Custody

Sample custody is defined by this QAPP as the following:

- The sample is in someone's actual possession;
- The sample is in someone's view after being in his or her physical possession;
- The sample was in someone's possession and then locked, sealed, or secured in a manner that prevents unsuspected tampering; or,
- The sample is placed in a designated and secured area.

Samples will be removed from storage areas by the sample custodian or laboratory personnel and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure.

Laboratory documentation used to establish chain of custody and sample identification may include the following:

- Field chains of custody or other paperwork that arrives with the sample;
- Laboratory chain of custody;
- Sample labels or tags attached to each sample container;
- Sample custody seals;
- Sample preparation logs (i.e., extraction and digestion information) recorded in hardbound laboratory books, filled out in legible handwriting, and signed and dated by the chemist;
- Sample analysis logs (e.g., metals, GC/MS, etc.) information recorded in hardbound laboratory books that are filled out in legible handwriting, and signed and dated by the chemist;
- Sample storage log (same as the laboratory chain of custody); and,
- Sample disposition log, which documents sample disposal by a contracted waste disposal company.

3.6 Sample Tracking

All samples will be maintained in the appropriate coolers prior to and after analysis. Laboratory analysts will remove and return their samples, as needed. Samples that require internal chain of custody procedures will be relinquished to the analysts by the sample custodians. The analyst and sample custodian will sign the original chain of custody relinquishing custody of the samples from the sample custodian to the analyst. When the samples are returned, the analyst will sign the original chain of custody returning sample custody to the sample custodian. Sample extracts will be relinquished to the instrumentation analysts by the preparatory analysts. Each preparation department will track internal chain of custody through their logbooks/spreadsheets.

Any change in the sample during the time of custody will be noted on the chain of custody (e.g., sample breakage or depletion).

3.7 Indoor Air and Ambient Air Sampling Methodology

It is anticipated that six indoor air samples and one ambient air sample will be collected during each baseline and post-remedial sampling event in accordance with the NYSDOH Soil Vapor Guidance. Some sample locations may be adjusted based on field observations or conditions.

Indoor and ambient air samples will be collected from breathing height (three to five feet above the floor) from within the Site buildings. The sampling flow rate will not exceed 0.2 L/min. Sampling will occur for eight-hours in commercial and industrial structures; the duration of the ambient air sample will be the same as the indoor air samples that are being collected. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

Samples will be collected in laboratory-supplied batch-certified 6-liter Summa canisters and will be sealed, labeled, and placed in a secure container for delivery to a NYSDOH ELAP-certified analytical laboratory. All indoor air and ambient air samples will be analyzed for EPA Method TO-15 VOCs. EPA Method TO-15 Selected Ion Monitoring (SIM) will be used for the following five compounds in indoor and ambient air samples: trichloroethene; cis-1,2-dichloroethene; 1,1-dichloroethene; carbon tetrachloride and vinyl chloride, which require a minimum laboratory reporting limit of 0.20 micrograms per cubic meter (mcg/m3) or less.

3.8 Analytical Methods/Quality Assurance Summary Table

A summary of the analytical methods and quality assurance methods are included in Table 1, below.

Table 1
Analytical Methods/Quality Assurance Summary

Matrix	Proposed Samples	QA/QC Samples				Total # Samples	Analytical Parameters	Methods	Preservative	Holding Times	Container
		TB	FB	DUP	MS/MSD						
Indoor Air	6 (per sampling event)	No QA/QC Samples				6	VOCs	TO-15 SIM	None	30 days	(1) 6-L Summa Canister
Ambient Air	1 (per sampling event)					1					

TB – Trip Blank
FB – Field Blank
DUP – Duplicate
°C – degrees Celsius
mL – milliliter
L – liter

3.9 Decontamination

Where possible, samples will be collected using new, dedicated sampling equipment so that decontamination is not required. All non-dedicated drilling tools and equipment will be decontaminated between boring locations using potable tap water and a phosphate-free detergent (e.g., Alconox) and/or a steam cleaner. All non-dedicated sampling equipment will also have a final rinse with deionized water. Decontamination water will be collected and disposed as investigation-derived waste (IDW).

3.10 Data Review and Reporting

The NYSDEC ASP Category B data package will be validated by an independent data validation subconsultant and a DUSR summarizing the results of the data validation process will be prepared. All reported analytical results will be qualified as necessary by the data validation and will be reviewed and compared against background concentrations and/or applicable New York State criteria:

Indoor Air Samples – Air Guideline Values (AGVs).

A Construction Completion Report documenting the Interim Remedial Measures Work Plan will be prepared, and will describe Site conditions and document applicable observations made during the sample collection. In addition, the report will include a description of the sampling procedures, tabulated sample results and an assessment of the data and conclusions. The laboratory data packages, DUSR, and field notes will be included in the report as appendices. All data will also be submitted electronically to NYSDEC via the Environmental Information Management System (EIMS) in EqUIS format.

Appendix A - Resumes

Alana M. Carroll, PG
Senior Project Manager

PROFESSIONAL PROFILE

Ms. Alana Carroll is a professional geologist with experience managing a variety of environmental consulting projects in the New York metropolitan area and specializing in remedial investigations, conceptual site modeling, and remedial design and implementation. She provides analytical, technical, and regulatory guidance to clients, including developers and environmental attorneys, on a variety of projects in various stages of investigation, remediation, and redevelopment. Ms. Carroll has managed projects from inception through investigation, remediation, and closure in the New York State Brownfield Cleanup Program, the New York State Department of Environmental Conservation (NYSDEC) Spills and Voluntary Cleanup Programs, the New York State Superfund Program, and the New York City E-Designation Program.

CREDENTIALS AND PROFESSIONAL HONORS

New York State Licensed Professional Geologist #000979
Adjunct Professor, Manhattan College, School of Engineering
M.A., Earth and Environmental Sciences, Brooklyn College, New York
B.S., Geology, Hofstra University, Uniondale, New York

CONTINUING EDUCATION AND TRAINING

OSHA 10-Hour Construction Training (2015)
Hazardous Waste Operations and Emergency Response 40-Hour Certification
(2004; refreshers 2005, 2006, 2007, 2009, 2010, 2011, 2012, 2013, 2014, and 2015)
First Aid and CPR Certified (2012)
Amtrak Contractor Safety Training (2010 and 2011)

PROFESSIONAL AFFILIATIONS

Member of Geologic Society of America
Member of New Partners for Community Revitalization

RELEVANT EXPERIENCE

New York State Brownfield Cleanup Program, Former West 18th Street MGP Site, Block 690, Lots 20 and 29, West Chelsea, Manhattan, New York—Successfully guided the client into the Brownfield Cleanup Program at the remediation stage. Prepared detailed remedial cost estimates for several redevelopment scenarios. Assisted in negotiating cleanup costs on behalf of the developer with the entity responsible for onsite contamination from former manufactured gas plant (MGP) operations. Designed and managed a pre-design investigation that delineated onsite coal tar impacts and differentiated petroleum impacts. Served on a team that designed an *in situ* stabilization treatability study. Prepared the Remedial Action Work Plan and Alternatives Analysis that included the excavation and removal of coal tar source material within two MGP gas holders and the encapsulation of residual coal tar. Performed an essential role on the construction and design team, coordinating with the structural, foundation, mechanical, and architectural contractors.

New York State Brownfield Cleanup Program, 520 West 28th Street, West Chelsea, Manhattan, New York—Managed several investigations to address New York State Spills, New York City E-Designation, and New York State Brownfield Cleanup programs. Prepared scopes of work to address requirements of both State and City regulatory agencies. Served as an essential member of the construction and design team, coordinating with the structural, foundation, mechanical, and architectural contractors. Managed access with adjacent property owners for full-scale excavation. Coordinated with State and City agencies for the satisfaction of air, noise, and hazardous waste requirements. Coordinated and managed the characterization and disposal of over 35,000 tons of hazardous material and historic fill. Designed and managed the remedial action necessary to obtain a successful Track 1 Cleanup. Assisted in negotiating a nuanced approach to support excavation that allowed for a Track 1 Cleanup. Prepared the final engineering report that expedited the certificate of completion.

New York State Brownfield Cleanup Program, Teitelbaum Dry Cleaner, Long Island City, New York—Designed and managed multiple onsite and offsite investigations to address NYSDEC and New York State Department of Health (NYSDOH) regulatory requirements with respect to chlorinated solvent impacts to groundwater and soil vapor. Designed and managed chlorinated solvent plume delineation and remediation in both groundwater and soil vapor. Prepared a technical memorandum on the fate and transport of the onsite chlorinated solvent groundwater plume that established limited liability for downgradient impacts and identified a secondary source. Coordinated with multiple adjacent parties for access. Designed a remedial approach for the site building that included source removal, groundwater injection, and a retro-fitted sub-slab depressurization system (SSDS).

Confidential Project, Steuben County, NY—Performed a forensic review and analysis of environmental records associated with five parcels of land that the State deemed as illegal solid waste dumps. Prepared and presented two technical arguments to NYSDEC and NYSDOH detailing illegal dumping, historic fill material, human health exposure pathways, bioavailability of historic fill constituents and remedial alternatives. Designed a full-scale remedial investigation of soil, groundwater and sediments for five parcels of historically industrial land.

New York City Voluntary Cleanup Program, Gallery Row, West Chelsea, Manhattan, New York—Managed multiple investigations over five tax lots to address New York City E-Designation and Voluntary Cleanup Program requirements. Designed a remedial action that incorporates a phased and targeted excavation below Highline Park. Coordinated with State and City agencies for the satisfaction of air, noise, and hazardous waste requirements. Served as an integral part of the construction and design team.

New York State Brownfield Cleanup Program, Former Nu-Brite Dry Cleaner, 1299 First Avenue, East Side, Manhattan, New York—Designed and managed multiple investigations to address onsite chlorinated solvent impacts to soil, groundwater, and soil vapor. Site challenges included investigation and remedial action within existing, occupied building sites. Designed and managed a bedrock fracture investigation to address potential impacts to bedrock. Designed and managed offsite delineation of chlorinated solvent plume in soil vapor. Directed multiple offsite soil vapor investigations within adjacent properties; assisted in negotiating several nuanced access agreements. Managed an onsite interim remedial measure including the installation of a retro coat vapor barrier and retro-fitted SSDS within the site building.

New York State Brownfield Cleanup Program, 34th Street and 42nd Street, West Side, Manhattan, New York—Designed and managed multiple investigations to address New York State Spills and Brownfield Cleanup programs. Prepared scopes of work to address requirements of both state regulations and those agreed to by the former owner. Coordinated

with NYSDEC to modify scopes based on field observations and limitations, which resulted in not having to mobilize for additional investigations. Coordinated with multiple entities for access to perform investigations, including Javits Convention Center, Amtrak, New York City Department of Transportation, Metropolitan Transit Authority, and their contractors. Developed a three-phase analysis plan with the laboratory to determine the minimum required extent of excavation next to an Amtrak line while limiting analytical costs, decreasing in the extent of excavation, and lowering disposal and structural support requirement costs.

New York State Brownfield Cleanup Program, 388 Bridge Street, Downtown Brooklyn, New York—Designed and managed all onsite and offsite investigations of soil, soil gas, groundwater, and indoor air, including coordination of staff and subcontractors. Prepared investigation reports for submittal to client, project team, NYSDEC, and NYSDOH. Participated in project team decision making with clients, lawyers, construction manager, and other consultants. Managed New York City Transit approvals for subsurface investigations near subway lines. Coordinated offsite access in residences, commercial spaces, and a private school. Participated in soil vapor extraction pilot test implementation and reporting. Assisted with implementation of an offsite SSDS in an existing building; activities included system design/layout, installation oversight, testing, and long-term operation and maintenance. Responsible for NYSDEC/NYSDOH coordination and reporting for all investigations. Tracked project activities for inclusion in NYSDEC/NYSDOH programmatic submittals, including monthly reports and remedial schedules.

New York Department of Environmental Remediation, Class 2 State Superfund, Laurel Hill Site, Queens, New York—Managed multiphase, multiparcel project involving design, installation, and ongoing operation, maintenance, and monitoring of six remedial caps. Site challenges included the division of the site into individual parcels that were independent of one another; subsequently, each parcel had a stormwater management design individual to the surrounding parcels. Other challenges included the site's position in a wetlands area fronting Newtown Creek, and working with the New York City Department of Transportation to facilitate its schedule for the adjacent Kosciusko Bridge restoration.

New York State Brownfield Cleanup Program, Willets Point Development, Queens, New York—Managed the Brownfield Cleanup Program application and Phase I environmental site assessment effort for 45 parcels of industrialized land. Coordinated with multiple interested parties, including New York City Department of Housing Preservation and Development and the Economic Development Corporation for access and contracting.

New York State Brownfield Cleanup Program, Uniforms for Industry, Queens, New York—Designed and managed an alternative approach to the offsite soil vapor intrusion investigation. Utilized soil vapor modeling to evaluate potential human health risks and migration probabilities. Provided support for the design of a retrofitted passive venting system.

New York State Spills Program, Gotham Center, Queens, New York—Responsible for proposal and budget development, subcontractor selection and coordination, negotiation, and preparation of subcontractor terms and agreements, budget, and invoice review for a comprehensive subsurface investigation. Prepared and implemented scope of work for delineation of soil contamination and calculation of contaminant mass estimates. Subsequent to interpretation of site data and subgrade characteristics, developed and presented remedial alternatives and associated costs for internal and client project teams. Prepared remedial investigation report in coordination with the New York City Economic Development Corporation and the client for submittal to state regulators.

Matthew Carroll, P.E.
Environmental Engineer/Principal

Experience Summary

Matthew Carroll is an environmental engineer experienced in all aspects of site assessment and development and implementation of remedial strategies. He has managed projects from inception through investigation, remediation and closure. His expertise includes soil, soil gas, and groundwater remediation, preparation of cost estimates, remedial alternative selection and design, soil characterization for disposal, field safety oversight, and preparation of work plans and reports to satisfy New York and New Jersey state requirements, and New York City "e" designation and restrictive declarations. Mr. Carroll's project management experience includes past management of a New York City School Construction Authority hazardous materials contract. He is responsible for all engineering work performed by Tenen and is currently the project manager and remedial engineer for several New York State Brownfield Cleanup Program sites.

Selected Project Experience

470 Kent Avenue, Brooklyn
As project manager, supported the client in due diligence and transactional activities, including a Phase I ESA, preliminary site investigation, and remedial cost estimate; preparation of BCP application and remedial investigation work plan. The former manufactured gas plant, sugar refinery and lumberyard will be developed as a mixed-use project with market rate and affordable housing and public waterfront access. As remedial engineer, will be responsible for development of remedial alternatives and oversight and certification of all remedial activities.

500 Exterior Street, Bronx
Designed and implemented the investigation of this former lumberyard and auto repair shop that will be redeveloped as mixed use development with an affordable housing component; prepared BCP application and subsequent work plans and reports. Designed a remedial strategy incorporating both interim remedial measures (IRMs) and remediation during the development phase.

Gateway Elton I and II, Brooklyn
Conducted soil disposal characterization, prepared Remedial Action Work Plans and designed methane mitigation systems for two phases of a nine-building residential development and commercial space; prepared and oversaw implementation of a Stormwater Pollution Prevention Plan during construction and prepared and certified the remedial closure reports for the project.

Affordable Housing Development, Rye, NY
Consultant to the City of Rye on environmental issues pertaining to a county-owned development site slated for an afford senior housing; reviewed environmental documentation for the project and prepared summary memorandum for City Council review; recommended engineering controls to address potential exposure to petroleum constituents, presented report findings at public meetings and currently providing ongoing environmental support during project implementation.

Queens West Development BCP Site, Long Island City, New York
Assistant Project Manager for two developers involved in the site.

- Responsible for oversight of remediation under the New York State Brownfield Cleanup Program
- Technical review of work plans and reports and coordination of the Applicant's investigation and oversight efforts
- Provided input for mass calculations and well placement for an in-situ oxidation remedy implemented on a proposed development parcel and within a City street
- Conducted technical review of work pertaining to a former refinery. Documents reviewed included work plans for characterization and contaminant delineation; pilot test (chemical oxidation); remediation (excavation and groundwater treatment). Managed field personnel conducting full time oversight and prepared progress summaries for distribution to project team
- Following implementation of remedial action, implemented the Site Management Plan and installation/design of engineering controls (SSDS, vapor barrier/concrete slab, NAPL recovery). Also responsible for coordination with NYSDEC

Brownfield Cleanup Program Redevelopment Sites – West Side, New York City
Managed remediation of a development consisting of four parcels being addressed under one or more State and city regulatory programs (NYS Brownfield Cleanup Program, NYS Spills, and NYC "e" designation program). Remediation includes soil removal, screening and disposal; treatment of groundwater during construction dewatering and implementation of a worker health and safety plan and community air monitoring plan (HASP/CAMP)

Managed an additional BCP site, supported the Applicant in coordination with MTA to create station access for the planned No. 7 subway extension; also provided support the client in coordination with Amtrak to obtain access for remedial activities on the portion of the site that is within an Amtrak easement. The site will eventually be used for construction of a mixed-use high-rise building.

BCP Site, Downtown Brooklyn, New York
Performed investigation on off-site properties and designed an SSDS for an adjacent building, retrofitting the system within the constraints of the existing structure; coordinated the installation of the indoor HVAC controls and vapor barrier; provided input to the design of a SVE system to address soil vapor issues on the site.

West Chelsea Brownfield Cleanup Program Site
Designed an in-situ remediation program and sub-slab depressurization system to address contamination remaining under the High Line Viaduct; SSDS design included specification of sub-grade components, fan modeling and selection, identifying exhaust location within building constraints and performance modeling; prepared the Operations Maintenance and Monitoring Plan and Site Management Plan sections pertaining to the SSDS.

Historic Creosote Spill Remediation – Queens, New York – New York State Voluntary Cleanup Program
Modeled contamination volume and extent and prepared mass estimates of historic fill constituents and creosote-related contamination; designed a soil vapor extraction (SVE) and dewatering system to address historic creosote release both above and below static

water table; coordinated with the Metropolitan Transit Authority and prepared drawings to secure approval to drill in the area of MTA subway tunnels.

NYSDEC Spill Site– Far West Side, Manhattan
Provided support to client during negotiations with a major oil company regarding allocation of remedial costs. Worked with client's attorney to develop a regulatory strategy to address the client's obligations under the NYSDEC Spills Program and the New York City "e" designation requirements.

Affordable Housing Site, Brooklyn, New York
Modified prior work plans for soil, soil vapor and groundwater investigation to address requirements for site entry into the New York City Brownfield Cleanup Program. Prepared technical basis for use of prior data previously disallowed by OER. Currently conducting site investigation.

New York City School Construction Authority Hazardous Materials Contract
Provided work scopes and cost estimates, managed and implemented concurrent projects, including Phase I site assessments, Phase II soil, groundwater and soil gas investigations, review of contractor bid documents, preparation of SEQR documents, specifications and field oversight for above- and underground storage tank removal, and emergency response and spill control.

Former Manufacturing Facility, Hoboken, New Jersey
Evaluated site investigation data to support a revision of the current property use to unrestricted; modified the John & Ettinger vapor intrusion model to apply the model to a site-specific, mixed use commercial/residential development; implemented a Remedial Action Work Plan that included the characterization, removal and separation of 9,500 cubic yards of historic fill; designed and implemented a groundwater characterization/delineation program using a real-time Triad approach; designed and implemented an innovative chemical oxidation technology for the property.

F**ormer Varnish Manufacturer – Newark, New Jersey**
Prepared a Phase I environmental site assessment; implemented soil and groundwater sampling to assess presence of petroleum and chlorinated compounds; prepared alternate cost remediation scenarios for settlement purposes and implemented a groundwater investigation plan, including pump tests and piezometer installation to assess the effect of subsurface utilities and unique drainage pathways upon contaminant transport.

Education and Certifications

Professional Engineer, New York
Bachelor of Engineering, Environmental; Stevens Institute of Technology, 2002
Bachelor of Science, Chemistry, New York University, 2002
Technical and Regulatory Training in Underground Storage Tanks, Cook College, Rutgers University, 2006

Mohamed Ahmed, Ph.D., C.P.G.
Sr. Geologist/Principal

Experience Summary

Mohamed Ahmed is a certified professional geologist with nearly 23 years of experience in the New York City metropolitan area. He has designed and implemented subsurface investigations and is proficient in groundwater modeling, design of groundwater treatment systems and soil remediation. He has managed numerous projects focused on compliance with the New York State Brownfield Cleanup and Spills programs and the New York City "e" designation program. Dr. Ahmed also has extensive experience in conducting regulatory negotiations with the New York State Department of Environmental Conservation, the NYC Office of Housing Preservation and Development, and the Mayor's Office of Environmental Remediation.

Selected Project Experience

Willoughby Square, Downtown Brooklyn
As Project Manager, directs all regulatory interaction and investigation on this joint public-private sector redevelopment that will include a public park and four-level underground parking garage. Prepared the remedial investigation work plan and remedial action work plan, conducted investigation activities and waste characterization, and negotiated with the NYC Department of Environmental Protection and the Mayor's Office of Environmental Remediation to transition the site into the NYC Voluntary Cleanup Program.

School Facility, Borough Park, Brooklyn
Managed all regulatory agency coordination, work plan and report preparation and remedial oversight; worked with OER to determine measures to retroactively address the hazardous materials and air quality E-designations on a previously constructed school building and prepared supporting documentation to justify the use of electrical units rather than natural gas.

LGA Hotel Site, East Elmhurst, Queens
Project manager for all work conducted at this former gasoline service station which is being remediated under the NYS Brownfield Cleanup Program; technical oversight of work plans, reports, and design and implementation of field and soil disposal characterization.

436 10th Avenue, Manhattan
As project manager and technical lead, assisted client in developing remedial cost estimates used for property transaction, developed regulatory strategy to address NYS Spills and NYC E-designation requirements, and currently overseeing remedial activities which include removal and disposal of petroleum-contaminated bedrock and dewatering and disposal of impacted groundwater.

Brownfield Cleanup Program Site, Downtown Brooklyn
Managed investigation and remediation under the BCP program for a proposed mixed-use development; designed the remedial investigation and prepared the remedial action work plan which includes an SVE system monitored natural attenuation. Prepared remedial cost

estimates for several scenarios. The project will include a 53-story mixed-use structure and parking garage.

Queens West Development, Long Island City
Directed project team and subcontractors for soil investigation/remediation studies on multiple properties; provided technical support for negotiations with NYSDEC during investigation and remediation.

Former Creosote Site, Long Island City
Designed and implemented a complex investigation to assess the nature and extent of historic creosote contamination at this former industrial site; conducted studies to optimize recovery of LNAPL and DNAPL and developed strategies using bioremediation and natural attenuation in conjunction with conventional remedial approaches. Performed pilot tests for soil vapor extraction system design and coordinated with NYSDEC and NYSDOH to implement sub-slab soil vapor sampling.

NYSDEC Spill Site – Far West Side, Manhattan
Developed a detailed remedial cost estimate for to support client negotiations with a major oil company. The estimate included costs pertaining to: chipping, removal and disposal of petroleum-impacted bedrock; removal/disposal of recycled concrete; costs for dewatering and disposal of impacted groundwater during construction; and design and installation of a vapor barrier below the redevelopment.

Active Industrial Facility, Newburgh, New York
Designed remedial investigation of soil and groundwater contaminated with trichloroethane; performed soil vapor pilot test and pump test to aid in design of soil and groundwater remediation alternatives; conducted sub-slab vapor sampling in accordance with NYSDOH guidance.

Former Dry Cleaning Facility, New York City
Conducted soil and groundwater investigations, designed and installed a soil vapor extraction system and performed extensive testing of indoor air. Negotiated the scope of the RI and IRM with NYSDEC.

Waterfront Redevelopment, Yonkers, NY
Designed and performed geophysics survey of six parcels to determine locations of subsurface features; supervised test pit excavation to confirm geophysics results and evaluate and classify soil conditions prior to development activities.

Prince's Point, Staten Island, New York
Performed soil, groundwater and sediment sampling to delineate the extent of contamination; used field-screening techniques to control analytical costs and supervised soil excavation and disposal.

Apartment Complex, New York City, New York
Coordinated with Con Edison, the owner of the adjacent property and NYSDEC to determine oil recovery protocol; assessed hydrogeological conditions and conducted pilot tests to design cost-effective recovery system; designed and supervised installation of recovery system.

Publications

"Impact of Toxic Waste Dumping on the Submarine Environment: A Case Study from the New York Bight". Northeastern Geology and Environmental Sciences, V. 21, No. 12, p. 102-120. (With G. Friedman)

Metals Fluxes Across the Water/Sediment Interface and the Influence of pH. Northeastern Geology and Environmental Sciences, in press. (With G. Friedman)

"Water and Organic Waste Near Dumping Ground in the New York Bight". International Journal of Coal Geology, volume 43. (With G. Friedman)

Education and Certifications

Ph.D., Earth and Environmental Sciences, Graduate Center of the City of New York (2001)
M.Ph., Earth and Environmental Sciences, City University of New York (1998)
M.A. Geology, Brooklyn College (1993)
B.S. Geology, Alexandria University, Egypt (1982)

American Institute of Professional Geologists, Certified Professional Geologist, 1997-2015

L.A.B. Validation Corp., 14 West Point Drive, East Northport, New York 11731

Lori A. Beyer

SUMMARY: General Manager/Laboratory Director with a solid technical background combined with Management experience in environmental testing industry. Outstanding organizational, leadership, communication and technical skills. Customer focused, quality oriented professional with consistently high marks in customer/employee satisfaction.

EXPERIENCE:

1998-Present L.A.B. Validation Corporation, 14 West Point Drive, East Northport, NY
President
- Perform Data Validation activities relating to laboratory generated Organic and Inorganic Environmental Data.

1998-Present American Analytical Laboratories, LLC. 56 Toledo Street, Farmingdale, NY
Laboratory Director/Technical Director
- Plan, direct and control the operation, development and implementation of programs for the entire laboratory in order to meet AAL's financial and operational performance standards.
- Ensures that all operations are in compliance with AAL's QA manual and other appropriate regulatory requirements.
- Actively maintains a safe and healthy working environmental that is demanded by local laws/regulations.
- Monitors and manages group's performance with respect to data quality, on time delivery, safety, analyst development/goal achievement and any other key performance indices.
- Reviews work for accuracy and completeness prior to release of results to customers.

1996-1998 Nytest Environmental, Inc. (NEI) Port Washington, New York
General Manager
- Responsible for controlling the operation of an 18,000 square foot facility to meet NEI's financial and operational performance standards.
- Management of 65 FTEs including Sales and Operations
- Ensure that all operations are in compliance with NEI's QA procedures
- Ensures that productivity indicators, staffing levels and other cost factors are held within established guidelines
- Maintains a quantified model of laboratory's capacity and uses this model as the basis for controlling the flow of work into and through the lab so as to ensure that customer requirements and lab's revenue and contribution targets are achieved.

1994-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Technical Project Manager
- Responsible for the coordination and implementation of environmental testing programs requirements between NEI and their customers
- Supervise Customer Service Department
- Assist in the development of major proposals
- Complete management of all Federal and State Contracts and assigned commercial contracts
- Provide technical assistance to the customer, including data validation and interpretation
- Review and Implement Project specific QAPP's.

1995-1996 Nytest Environmental, Inc. (NEI) Port Washington, New York
Corporate QA/QC Officer
- Responsible for the implementation of QA practices as required in the NJDEP and EPA Contracts
- Primary contact for NJDEP QA/QC issues including SOP preparation, review and approval
- Responsible for review, verification and adherence to the Contract requirements and NEI QA Plan

1992-1994 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Manager
- Responsible for the accurate compilation, review and delivery of analytical data to the company's customers. Directly and effectively supervised a department of 22 personnel.
- Managed activities of the data processing software including method development, form creation, and production
- Implement new protocol requirements for report and data management formats
- Maintained control of data storage/archival areas as EPA/CLP document control officer

1987-1991 Nytest Environmental, Inc. (NEI) Port Washington, New York
Data Review Specialist
- Responsible for the review of GC, GC/MS, Metals and Wet Chemistry data in accordance with regulatory requirements
- Proficient with USEPA, NYSDEC, NJDEP and NEESA requirements
- Review data generated in accordance with SW846, NYSDEC ASP, EPA/CLP and 40 CFR Methodologies

1986-1987 Nytest Environmental, Inc (NEI) Port Washington, New York
GC/MS VOA Analyst

EDUCATION:

1982-1985 State University of New York at Stony Brook, New York; BS Biology/Biochemistry
1981-1982 University of Delaware; Biology/Chemistry
5/91 Rutgers University; Mass Spectral Data Interpretation Course, GC/MS Training
8/92 Westchester Community College; Organic Data Validation Course
9/93 Westchester Community College; Inorganic Data Validation Course

Westchester Community College
Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

ORGANIC DATA VALIDATION COURSE (35 HOURS)

Dr. John Samuelian

Date AUGUST 1992

Assistant Dean
Professional Development Center

President

The Professional Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

Westchester Community College
Professional Development Center

Awards this Certificate of Achievement To

LORI BEYER

for Successfully Completing

INORGANIC DATA VALIDATION

Instructor: Dale Boshart

Date MARCH 1993

Assistant Dean
Professional Development Center

President

The Professional Development Center

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

July 8, 1992

Ms. Elaine Sall
Program Coordinator
Westchester Community College
Valhalla, NY 10595-1698

Dear Elaine,

Thank you for your letter of June 29, 1992. I have reviewed the course outline for organic data validation, qualifications for teachers and qualifications for students. The course that you propose to offer would be deemed equivalent to that which is offered by EPA. The individuals who successfully complete the course and pass the final written exam would be acceptable to perform the task of organic data validation for the Department of Environmental Conservation, Division of Hazardous Waste Remediation.

As we have discussed in our conversation of July 7, 1992, you will forward to me prior to the August course deadline, the differences between the EPA SOW/90 and the NYSDEC ASP 12/91. You stated these differences will be compiled by Mr. John Samulian.

I strongly encourage you to offer an inorganic data validation course. I anticipate the same list of candidates would be interested in an inorganic validation course as well, since most of the data to be validated consists of both organic and inorganic data.

Thank you for you efforts and please contact me if I can be of any further assistance.

Sincerely,

Maureen P. Serafini

Maureen P. Serafini
Environmental Chemist II
Division of Hazardous Waste
Remediation

The Professional
Development Center
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

October 2, 1992

Ms. Lori Beyer
3 sparkill Drive
East Northport, NY 11731

Dear Ms. Beyer:

Congratulations upon successful completion of the Organic Data Validation course held August 17 - 21, 1992, through Westchester Community College, Professional Development Center. This course has been deemed by New York State Department of Environmental Conservation as equivalent to EPA's Organic Data Validation Course.

Enclosed is your Certificate. Holders of this Certificate are deemed competent to perform organic data validation for the New York State DEC Division of Hazardous Waste Remediation.

The Professional Development Center at Westchester Community College plans to continue to offer courses and seminars which will be valuable to environmental engineers, chemists and related personnel. Current plans include a TCLP seminar on November 17th and a conference on Environmental Monitoring Regulations on November 18th.

We look forward to seeing you again soon at another environmental program or event. Again, congratulations.

Very truly yours,

Passing Grade is 70%
Your Grade is 99%

Elaine Sall
Program Coordinator

ES/bf

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595

The Professional
Development Center
AT
WESTCHESTER COMMUNITY COLLEGE

914 285-6619

June 21, 1993

Dear Ms. Beyer:

Enclosed is your graded final examination in the Inorganic Data Validation course you completed this past March. A score of 70% was required in order to receive a certificate of satisfactory completion. Persons holding this certificate are deemed acceptable to perform Inorganic Data Validation for the New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation.

I am also enclosing a course evaluation for you to complete if you have not already done so. The information you provide will greatly aid us in structuring further courses. We wish to make these course offerings as relevant, targeted and comprehensive as possible. Your evaluation is vital to that end.

Congratulations on your achievement. I look forward to seeing you again at another professional conference or course. We will be co-sponsoring an environmental monitoring conference on October 21, 1993 with the New York Water Pollution Control Association, Lower Hudson Chapter, at IBM's Yorktown Heights, NY site. Information regarding this event will be going out in August.

Very truly yours,

Elaine Sall

Elaine Sall
Program Coordinator

ES/bf

Enclosures

SUNY
WESTCHESTER COMMUNITY COLLEGE
Valhalla, New York 10595