



# Interim Remedial Measure Work Plan

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4125-4149 Laconia Avenue  
Bronx, New York

December 13, 2019

Prepared for:

**Laconia Properties LLC**  
**c/o Ditmars Real Estate Consultants**  
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## Plate

1. Soil Vapor and Air Detections

# 1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), has prepared this Interim Remedial Measure (IRM) and Soil Vapor Intrusion (SVI) Investigation Work Plan on behalf of Laconia Properties LLC (Laconia LLC) to detail the scope of work for the installation of an active sub-slab depressurization system (SSDS) beneath portions of the existing building and completing an SVI investigation at 4125-4149 Laconia Avenue, Bronx, New York (Site) during the 2019-2020 heating season. The Site location map is provided as Figure 1. This Work Plan is being submitted concurrently with Laconia LLC's revised application to the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP), and is proposed to be implemented pursuant to a Brownfield Cleanup Agreement (BCA) between Laconia LLC and NYSDEC.

In accordance with NYSDEC and New York State Department of Health (NYSDOH) requirements, the SVI Investigation is being conducted to assess soil vapor and indoor air conditions on-Site during the 2019-2020 heating season and to evaluate potential impacts to off-Site properties. Based on discussions with the NYSDOH, the heating season in the Bronx ranges from November 1 through April 1.

The SSDS is being installed to address soil vapor intrusion of chlorinated volatile organic compounds (CVOCs) documented to be present in soil vapor beneath portions of the on-Site building and indoor air in the basements of several tenant spaces that exceed NYSDOH's 2006 (as revised in 2017) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Vapor Guidance) decision matrices for mitigation. The extent of impacts exceeding the NYSDOH Vapor Guidance decision matrices (discussed in Section 2.0), is shown on Plate 1. The observed impacts are likely due to undocumented releases of dry-cleaning chemicals from the Jiffy One Hour Cleaners, (former Cleaners) tenant space (4127 Laconia Avenue – currently occupied by Edenwald Pharmacy Inc.).

This IRM/SVI Work Plan has been prepared in accordance with NYSDEC procedures set forth in the document titled DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the NYSDOH Vapor Guidance, and complies with all applicable Federal, State and local laws, regulations and requirements. Additionally, all invasive work will be completed in accordance with the health and safety plan (HASP) provided as Appendix A, which includes air monitoring during SSDS installation activities (see Section 5.12).

## 1.1 Objectives and Scope of the IRM/SVI Work Plan

The proposed SVI investigation will include the collection of sub-slab soil vapor samples during the 2019-2020 heating season from all existing sub-slab soil vapor monitoring points previously installed by Roux (as indicated on Figure 2), collection of indoor air samples adjacent to each existing sub-slab monitoring and collection of outdoor ambient air. Additionally, based on NYSDEC and the NYSDOH requirements and concerns that on-Site contaminated soil vapor may be impacting the nearby residential properties, the SVI investigation includes the installation and sampling of soil vapor monitoring points adjacent to and on



residential properties immediately west of the Site property boundary. Additional investigation or remedial measures may be required based upon the results of the SVI investigation.

The proposed IRM will retrofit portions of the existing two, attached one-story, buildings located at the Site, shown on Figure 2, with an SSDS capable of creating a negative pressure under the buildings and collecting potentially contaminated vapor for subsequent discharge to the atmosphere above the roof of the Site buildings. This IRM is a component of the overall investigation and remediation of the Site, which will address soil vapor intrusion issues.

The remainder of this IRM/SVI Work Plan is organized as follows:

- Section 2: Site Background
- Section 3: Scope of Work
- Section 4: Soils/Materials Management Plan
- Section 5: Reporting
- Section 6: IRM/SVI Work Plan Implementation Schedule

## 1.2 Certification

I, Charles McGuckin, certify that I am currently a New York State registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measure and Soil Vapor Intrusion Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER-10.

Charles J. McGuckin  
NYS Professional Engineer # 069505

12/13/2019  
Date



Signature

## 2. Site Background

This section provides relevant Site background information.

### 2.1 Site Description and History

Property Location	
Property Name:	4125-4149 Laconia Avenue
Property Description:	The property consists of two attached one-story buildings and a paved parking lot situated on one tax Lot (Lot 1). The on-Site buildings are currently occupied by various professional businesses, retail stores, and a restaurant. The property is bordered by E 231 <sup>st</sup> Street to the north, E 230 <sup>th</sup> Street to the south, Laconia Avenue to the east and residential properties to the west.
Property Address:	4125-4149 Laconia Avenue
Property Town, County, State:	Bronx, Bronx County, New York
Property Tax Identification:	Block 4877 Lot 1
Property Topographic Quadrangle:	USGS Mount Vernon Quadrangle, New York (2016)
Nearest Intersection:	E 230 <sup>th</sup> Street and Laconia Avenue
Area Description:	The area surrounding the Site is used mainly for residential purposes. Surrounding properties to the north and west are all residential properties. To the south of the Site, is the 47 <sup>th</sup> Precinct and to the east of the Site is a parking lot.
Current Site Zoning:	Commercial-Use, C1-4 - Area/Neighborhood Retail Center

Property Information	
Property Acreage:	0.74 acres (total)
Property Shape:	Rectangular
Property Use:	The property is currently occupied by various professional businesses, retail stores, and a restaurant.
Number of Buildings:	Two (attached)
Number of Stories:	Two one-story buildings
Date of Construction:	c. 1958
Basement/ Slab-on-Grade:	Basement
Number of Units:	Eight
Ceiling Finishes:	Acoustic ceiling tiles and exposed structural elements
Floor Finishes:	Carpet, tile and bare concrete
Wall Finishes:	Painted drywall and exposed structural elements
HVAC:	Natural Gas
Renovation Date:	N/A
Vehicular Access:	Via Laconia Avenue or E 230 <sup>th</sup> Street
Other Improvements:	Paved Parking Area
Property Coverage:	Footprint of the buildings, sidewalks and associated parking area

### **2.1.1 Site Operations**

The Site is currently occupied by various professional businesses, retail stores, and a restaurant. The former Cleaners tenant space is currently occupied by Edenwald Pharmacy Inc.

### **2.1.2 Topography/Hydrogeology**

The property location is shown on the 2016 USGS Topographic Map of Mount Vernon, New York. The surface elevation of the property is approximately 105 feet above mean sea level. Topography of the property slopes slightly to the north and east.

Groundwater was encountered at approximately 10 feet below ground surface (ft-bgs) or approximately one to two feet below the buildings' basement concrete slabs during previous environmental investigations conducted by others and Roux. Based on the previous environmental investigations, groundwater beneath the Site flows in a northeastern direction.

## **2.2 Summary of Environmental Conditions**

Previous investigations (soil, groundwater, and soil vapor/indoor air sampling) performed at the Site from 2018 to 2019 identified petroleum-related compounds and CVOCs in soil vapor and indoor air, and CVOCs in soil and groundwater at the Site.

The petroleum-related compounds are attributed to petroleum spills associated with the 47th Precinct located immediately south of the Site, across E 230th Street (NYSDEC spill number 9407396). Based upon environmental reports prepared for the ongoing 47th Precinct cleanup, petroleum contamination (soil, groundwater and soil vapor) from that spill appears to have migrated beneath E 230th Street and onto the Site. The 47th Precinct reports show that separate phase hydrocarbons (SPH) accumulations have been detected in groundwater monitoring wells installed for that cleanup in the sidewalk located on the north side of E 230th Street, immediately adjacent to the Site building.

Based on investigations completed by Merritt Environmental Consulting Corp. (Merritt) in 2018/2019 and by Roux in 2019, soil vapor and indoor air (in the basements of some retail spaces) at the Site have been impacted by CVOCs, predominately tetrachloroethene (PCE) and trichloroethene (TCE), above applicable regulatory guidance values. Additionally, soil and groundwater beneath the former Cleaners space have been impacted by CVOCs, predominantly PCE and TCE, above applicable regulatory guidance values. The former Cleaners was in operation at the Site in the early 1970's. The extent of the CVOCs impacts to soil, groundwater and soil vapor/indoor air has not been fully delineated. Delineation of the extent of CVOCs impacts to soil, groundwater and soil vapor/indoor will be completed during future Remedial Investigation (RI) activities at the Site. A RI Work Plan (RIWP) will be submitted to the NYSDEC under separate cover.

### **2.2.1 NYSDEC Brownfield Cleanup Program**

This Work Plan is being submitted concurrently with Laconia LLC's revised BCP application. Laconia LLC's initial BCP application was submitted to the NYSDEC on November 1, 2019. This IRM/SVI Work Plan is proposed to be implemented pursuant to a BCA between Laconia LLC and NYSDEC.

### **2.2.2 Previous Environmental Sampling**

The following is a brief summary of environmental sampling conducted at the Site, focusing on soil vapor and indoor air results. A complete description of previous environmental sampling conducted at the Site will be included in a RI Report. A description of previous environmental sampling conducted at the Site by Merritt between 2018 and 2019 is based on a review of the following report:

- Contaminant Delineation Investigation prepared by Merritt dated January 2019 on behalf of Laconia LLC.

Additional sampling was conducted by Roux in 2019. A description of environmental sampling conducted by Merritt and Roux in 2019, on behalf of Laconia LLC, is provided below.

During investigation activities conducted by Merritt in 2018/2019 and Roux in 2019, a total of eight sub-slab soil vapor samples, nine indoor air samples and two outdoor ambient air samples were collected at the Site. All sample locations are shown on Figure 2. Excerpted tables summarizing the sub-slab soil vapor and indoor air results from the Contaminant Delineation Investigation prepared by Merritt are provided in Appendix E. Sub-slab and indoor air sample results from Roux's 2019 investigation are provided in Table 1. Based on Merritt's and Roux's investigation results, petroleum-related compounds (i.e., benzene, toluene, ethylbenzene, and xylenes) and CVOCs (i.e., PCE, TCE, cis-1,2-dichloroethene and methylene chloride) were detected in sub-slab and indoor air samples. Table 1 below shows a summary of the PCE and TCE concentrations detected in sub-slab soil vapor and corresponding indoor air samples collected at the Site, as compared to the NYSDOH Vapor Guidance decision matrices for each sample:

**Table 1. Sub-Slab Soil Vapor/Indoor Air PCE and TCE Concentrations**

Sample Location	Sample Date	PCE Sub-Slab Concentrations / Sample Designation (µg/m³)	PCE Indoor Air Concentrations / Sample Designation (µg/m³)	TCE Sub-Slab Concentrations / Sample Designation (µg/m³)	TCE Indoor Air Concentrations / Sample Designation (µg/m³)	NYSDOH Matrices Stage
4125 Laconia Ave (Grocery & Deli)	10/8/2019	ND* (RSS-1)	0.869 (RIA-1)	ND (RSS-1)	0.14 (RIA-1)	No Further Action
4127 Laconia Ave (The Mandarin House)	10/8/2019	266 (RSS-2)	28.2 (RIA-2 DUP)	3.74 (RSS-2)	0.683 (RIA-2 DUP)	Mitigate
Basement Corridor	10/8/2019	2,200 (RSS-3)	1.95 (RIA-3)	392 (RSS-3)	ND (RIA-3)	Mitigate
4137 Laconia Ave (former Cleaners)	12/4/18	303,119 (SV-1)	21.7 (IA-1)	5,911 (SV-1)	2.42 (IA-1)	Mitigate
4139 Laconia Ave (former Margarita's Unisex Salon)	12/4/2018	NS	15.6 (IA-4)**	NS	1.61 (IA-4)**	Mitigate
4141 Laconia Ave (Associated Supermarket)	12/4/2018	28,480 (SV-2)	46.8 (IA-2)	3,385 (SV-2)	8.06 (IA-2)	Mitigate
		NS	9.49 (IA-3)***	NS	1.56 (IA-3)***	
	10/8/2019	3,890 (RSS-4)	NS	2,330 (RSS-4)	NS	
		692 (RSS-5)	15.1 (RIA-4)	377 (RSS-5)	2.48 (RIA-4)	
		208 (RSS-6)	14.8 (RIA-5)	58 (RSS-6)	2.39 (RIA-5)	

\* - Elevated petroleum-related compounds detected in RSS-1 sample with elevated laboratory reporting limits

\*\* - Sample IA-4 was collected on the first floor of 4139 Laconia Ave space (former Margarita's Unisex Salon space)

\*\*\*- Sample IA-3 was collected on the first floor of 4141 Laconia Ave space (Associated Supermarket space)

µg/m³ - Micrograms per cubic meter

ND - Not Detected

NS – Not sampled

DUP - Duplicate sample

Based on a comparison of the PCE and TCE concentrations detected in sub-slab soil vapor and indoor air samples at the Site to the NYSDOH 2017 Matrices, the majority of the building footprint requires mitigation and will be addressed by the proposed SSDS.

### 3. Scope of Work

The scope of work for the IRM/SVI consists of the following tasks:

- Completion of the SVI Investigation (prior to SSDS installation);
- Site mobilization and Site preparation for SSDS installation;
- Installation of the SSDS components;
- SSDS startup and verification of performance;
- Waste disposal (assumed to be minimal); and
- Documentation.

Although limited generation of waste is anticipated, implementation of the IRM/SVI will be in accordance with the Soils/Materials Management Plan (SoMP) included in Section 4 of this IRM/SVI Work Plan.

#### 3.1 SVI Investigation

Prior to mobilization for IRM activities, Roux will complete an SVI investigation at the Site to collect NYSDEC/NYSDOH-required soil vapor and indoor air samples during the 2019-2020 heating season. The SVI investigation will include the collection of six sub-slab soil vapor samples from all existing sub-slab soil vapor monitoring points previously installed by Roux, collection of six indoor air samples adjacent to each existing sub-slab monitoring point, and collection of one outdoor ambient air sample. Prior to sample collection, Roux will complete an inventory of all chemicals stored in the basements of the on-Site building. Additionally, in order to evaluate potential pathways of contamination from the Site to nearby properties, the SVI investigation will include the installation and sampling of three soil vapor monitoring points adjacent to the residential properties immediately west of the Site property boundary. All newly installed soil vapor monitoring points will be installed at approximately eight feet below land surface using hand tools and vacuum technology.

If bedrock or groundwater is encountered shallower than eight feet below land surface at any location, the soil vapor monitoring point will be installed approximately one foot above bedrock/groundwater, whichever is encountered first.

At each soil vapor monitoring point (vapor point), a six-inch long stainless-steel mesh sampling screen will be installed at the depth described above. Coarse sand will be added around and up to approximately six-inches above the top of the screen, creating a one-foot sample interval. A two-foot thick layer of bentonite hole plug will be added to the top of the sand and hydrated with potable water. The remainder of the borehole will be backfilled with a standard grout mix. The surface will be completed with a bolted five-inch diameter flush-mounted manhole cover.

Following vapor point installations, a tracer gas (e.g. helium) will be used to test the vapor point seals and verify that ambient air is not inadvertently being drawn into the sample during sample collection. The tracer gas test will also be conducted on all existing sub-slab monitoring points prior to sample collection. Following

tracer gas verification and an approximate 24-hour equilibration period for the newly installed vapor points, sub-slab vapor, indoor air, soil vapor and ambient outdoor air samples will be collected in accordance with the NYSDOH Vapor Guidance. Samples will be collected at each sub-slab vapor, indoor air, soil vapor and ambient outdoor air location over an 8-hour period using laboratory-supplied Summa canisters and calibrated flow controllers.

All sub-slab vapor, indoor air, soil vapor and ambient outdoor air samples, including quality assurance/quality control sample (duplicate indoor air sample), will be sent to Alpha Analytical of Westborough, Massachusetts (Alpha), which is a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory, under chain of custody procedures, and analyzed for VOCs using United States Environmental Protection Agency (USEPA) Method TO-15. Samples will be analyzed on a standard turnaround time and will be reported as Category B data deliverables.

### **3.2 Mobilization and Site Preparation for IRM**

A project kick-off meeting will be conducted with NYSDEC, Laconia LLC, Roux and the selected Contractor prior to the commencement of any IRM-related intrusive activities, if requested by NYSDEC. The Contractor will supply any labor (HAZWOPER Certified in accordance with OSHA 1910.120) and materials required for the implementation of the IRM scope of work. In addition, necessary permits, insurance, bonds, and licenses required to complete the work will be obtained and fees necessary to obtain these permits will be paid. Mobilization and Site preparation activities include:

1. Mobilization of equipment to the work area;
2. Installation of work area delineation zones;
3. Installation of sub-slab suction points with in-line fans;
4. Installation of header piping and roof leaders;
5. Installation of carbon treatment on roof; and
6. Demobilization of equipment.

### **3.3 SSDS Installation**

Sub-slab soil vapor samples collected during the previous investigations detected elevated concentrations of PCE and TCE on-Site; therefore, an active SSDS is proposed to be installed beneath the portions of the Site building shown on Drawing 1 to address potential exposure pathways. The proposed active SSDS will include vertical polyvinyl chloride (PVC) suction points to be retrofitted into the existing building foundation while maintaining the structural integrity of the foundation. The testing of the SSDS will be completed following installation.

The active SSDS for the Site, when complete, will consist of a network of vertical suction points creating a vacuum influence beneath the portion of the building basement slab shown on Drawing 1 (Appendix B). The design using a large quantity of low vacuum vapor suction points was deemed the most suitable due to the

high water table conditions beneath the basement. The in-line fans for each suction point will create a low-vacuum influence beneath the slab while avoiding extraction of water that would prevent system functionality. The SSDS floor plan design and piping details are provided in Appendix B. A description of the proposed active SSDS is provided below.

- All existing interior utility and slab penetrations will be sealed with silicone caulking, to the extent feasible.
- Ten vertical suction points with in-line fans will be installed to create a vacuum influence below the basement slab in areas of high sub slab vapor concentrations. Each suction point will consist of an elevated 2-foot by 2-foot pit extended 8-inches below the existing cellar slab and 6-inches above the cellar slab lined with non-woven geotextile. All suction points will consist of 4-inch PVC piping below grade, 4-inch steel or iron piping above grade in accordance with NYCDOB building codes and regulations and a RadonAway® GX5 Fan (or engineer approved equal). All suction points will also include a pressure gauge and alarm with indicator light visible to the site supervisor for inspection of operation.
- All SSDS piping will be pitched towards suction pits in a manner that allows for any moisture build up to drain back into the pits.
- Each suction point will have a shut off valve and vacuum gauge.
- The piping from the suction points will be brought to the roof along the interior of the building and manifolded to two separate roof risers. Each riser will be connected to a vapor phase granular activated carbon treatment system located on the roof of the building. Piping risers will be located on the roof, as to not interfere with the existing Site use.
- Any interior piping will be routed around existing heating, ventilation, and air conditioning (HVAC) ducts and utility pipes and supported, as needed. Exterior piping will be supported appropriately.
- Treatment systems will be installed on the roof on timber supports. The discharge stacks will extend above the parapet wall or a minimum of 4 feet above the roof line and will be supported as necessary. The discharge points will be located a minimum of 10 feet from any HVAC air inlets and the building edge.
- Eleven sub-slab soil vapor monitoring points will be used to monitor the performance of the SSDS. Five new monitoring points (MP-1 through MP-5) will be installed approximately where shown on Drawing 1 in Appendix B and six existing sub-slab sampling points (RSS-1 through RSS-6) will be used.

### **3.4 SSDS Startup and Testing**

Performance monitoring will be performed on the SSDS as part of the SSDS start-up to verify that the systems are operating properly and will consist of the following for each system:

- Confirm operation of the local alarm warning light;
- Confirm acceptable air flow rate (90 to 180 cubic feet per minute [cfm]) from the in-line fan by a visual inspection of gauges affixed to each fan;
- Confirm acceptable negative pressure readings (-1 to -5 inches of water column) from the SSDS and suction points by a visual inspection of gauges to each blower and suction point;
- Collect photoionization detector (PID) readings; and
- Collect confirmation effluent air samples.

Following the initial start-up, performance monitoring of the SSDS will include monitoring the system effluent VOC concentrations using a PID. In addition, during start-up of the SSDS, an effluent air sample will be collected from the discharge of each effluent stack using a Summa canister and analysed using USEPA Method TO-15 to verify that vapor treatment is effective or not needed. The effluent air sample results will



be compared to the DAR-1 Air Guide guidance values. If the sample results indicate that treatment is still required, appropriate treatment options will be continued and evaluated periodically.

Additionally, 30-days following initial start-up, indoor air samples will be collected from the basement areas using Summa canisters and analysed using USEPA Method TO-15 to verify that the SSDS is effectively reducing CVOC vapor intrusion into the building.

The system testing described above (excluding effluent air sampling) will be conducted if, in the course of the SSDS lifetime, significant changes are made to the SSDS, or if the system is shut down for an extended period for any reason, and the system must be restarted.

### **3.5 SSDS Operation, Maintenance and Monitoring (O, M & M)**

O, M & M procedures for the SSDS will be included in the Site Management Plan (SMP) for the Site but are outlined herein for the period prior to the SMP being in place.

#### **3.5.1 System Operation: Routine Operation Procedures**

Routine operation procedures will consist of monitoring the operation/vacuum at each in-line fan and verifying there is flow at the effluent stack.

#### **3.5.2 System Operation: Routine Equipment Maintenance**

The routine maintenance activities include visual inspections, operating data collection and general maintenance. Visual inspection is the routine part of the SSDS operator's activities. The system operator will note any conditions that present a potential hazard or could cause future system shutdown. In the field, special attention will be paid to the condition of the in-line fans and appurtenances, and the above slab discharge piping and supports. Special attention will also be given to any unusual or excessive noise or vibrations from the piping and in-line fans. The piping and valves will be inspected for leaks.

All equipment maintenance and inspections will be performed in accordance with manufacturer's instructions. Specific routine maintenance tasks are outlined below:

- Inspect in-line fans and piping to confirm operation and appropriate valve settings; and
- Inspect vacuum/pressure gauges for proper operation.

In the event that a condition warranting system component maintenance is identified, the appropriate reporting and maintenance should be conducted immediately. Manufacturer's recommendations for system component maintenance are included in the competent manuals in Appendix C. Any maintenance completed for the SSDS should be documented in the Maintenance Log included in Appendix D.

### **3.5.3 System Operation: Non-Routine Equipment Maintenance**

Non-routine equipment maintenance consists of maintenance activities that will be performed with less frequency than the routine maintenance (i.e., semi-annually) on several system components. Specific non-routine maintenance tasks are outlined below:

- Replacement of vacuum/pressure gauges; and
- Replacement of in-line fans.

Damage to any SSDS components will be noted during the routine and detailed system inspections and remedied upon identification. Any maintenance completed for the SSDS should be documented in the SSDS Log included in Appendix D.

## **3.6 Waste Disposal**

All wastes generated during the installation of the SSDS will be handled, transported and disposed of in a manner consistent with Federal, State and local laws and regulations. A limited amount of soil is anticipated to be generated during SSDS installation since the majority of the SSDS piping will be installed above the basement concrete slab/floor. However, based on results of soil samples collected during previous investigation activities, soil containing elevated concentrations of CVOCs is not anticipated to be encountered during SSDS installation and is expected to be declassified as non-hazardous waste under the NYSDEC Contained-In Determination Policy and disposed of as non-hazardous waste, pending NYSDEC approval.

## **3.7 Documentation**

Detailed information regarding the IRM (e.g., as-built drawings, waste disposal documentation, backfill documentation, photographs, etc.) will be included in the Final Engineering Report (FER) described in Section 5.

## 4. Quality Assurance / Quality Control

The following procedures will be used to ensure that samples are collected and handled in accordance with NYSDEC quality assurance/quality control (QA/QC) protocols.

### Laboratory Testing

A New York State ELAP-certified laboratory will be used for all laboratory analysis. The laboratory will operate a QA/QC program that will consist of proper laboratory practices (including the required chain-of-custody), an internal quality control program, and external quality control audits by New York State. The laboratory will be Alpha Analytical of Westborough, Massachusetts (Alpha), which is an ELAP-certified laboratory.

### Laboratory Methods and Holding Times

Table 2 below summarizes the laboratory methods, sample preservatives, minimum volume required and holding time that will be used to analyze the sub-slab soil vapor, soil vapor, indoor air and outdoor ambient air samples.

**Table 2. Laboratory Methods, Sample Preservatives, Minimum Volume Required and Holding Time**

Matrix	Quantity (Approximate)	Analysis	Method	Preservation	Volume/ Container	Holding Time
Soil Vapor/Air	17	VOCs	USEPA TO-15	None	1 x 6 mL Summa Canister	28 Days

mL – Milliliters

### Field Quality Assurance/Quality Control

Field duplicate samples will be collected for indoor air samples at a rate of one duplicate sample per 20 field samples.

Field blank samples will be collected for soil and groundwater samples, if collected, at a rate of one field blank sample per 20 field samples.

Trip blank samples will be collected at a rate of one trip blank per cooler with groundwater samples, if collected, for VOCs.

### Field Decontamination Procedures

Refer to Appendix A (HASP).

### Chain of Custody

To ensure the integrity of samples collected, a strict chain of custody record must be maintained on each sample. This begins after sampling with the entry in the sampler's field log book of the sampling details:

- Date and time of sampling
- Sample location (as specific as possible)
- The unique sample number, size, and containers used
- Sample description
- Weather conditions (if applicable)
- Any additional comments

In addition, a record must be kept of the sample's progress from the sample site to the laboratory where it will be analyzed. The chain-of-custody form must include:

- The sample number/identification
- The sampler's name
- Date and time of sampling
- Location at which the sample was taken, including the address, if possible
- A description of the sample, as best known
- Signatures of people involved in the chain of possession
- Inclusive dates of possession of each person in the chain

The chain-of-custody form must accompany the sample throughout its trip to the laboratory. If the samples must be shipped to a laboratory, most shipping agents will refuse to sign or separately carry the chain-of-custody form. In this one case, it is permissible to put the chain-of-custody form into the cooler with the sample and then seal the box. The recipient of the cooler, the laboratory's sample custodian, can then attest to the cooler's arrival still sealed and unopened. Accompanying the chain-of-custody record, or included in it, must be a request to the laboratory for sample analysis. Information required includes:

- Name of person receiving the sample
- Laboratory sample number
- Date of sample receipt
- Sample allocation
- Analysis to be performed

Finally, on arrival at the laboratory, the sample custodian must enter the sample in the laboratory's sample log book. The chain-of-custody should be kept on file at the laboratory.

### **Data Usability Summary Report**

All laboratory data are to be reported in NYSDEC ASP Category B deliverables for validation purposes. All soil vapor and air analytical results will undergo a third-party review and will be validated in accordance with Section 2.2(a)1.ii and Appendix 2B of NYSDEC Division of Environmental Remediation DER 10, Technical Guidance for Site Investigation and Remediation – Guidance for Data Deliverables and Development of Data Usability Summary Reports (DUSR). The analytical results will be evaluated to determine whether the data

meet NYSDEC data quality requirements. A third party, as defined in DER 10, will evaluate the data and prepare the DUSRs. All validated data will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (<http://www.dec.ny.gov/chemical/62440.html>).

## **5. Soil/Materials Management Plan**

Although the amount of earthwork is expected to be very limited, the following sections provide the SoMP to be implemented during the IRM, as necessary.

### **5.1 Soil Screening Methods**

Visual, olfactory and PID soil screening and assessment will be performed during SSDS installation activities under the supervision of Roux personnel.

### **5.2 Containerization of Waste**

All soil generated during SSDS installation will be containerized in labeled, New York State Department of Transportation (NYSDOT) rated 55-gallon drums or roll-off containers, which will be fitted with tight fitting covers. If waste is determined to be hazardous, it will be disposed of within 90 days of generation at an approved hazardous waste disposal facility.

### **5.3 Characterization of Excavated Materials**

Soil/fill or other excavated media that will be transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations.

### **5.4 Materials Excavation and Load Out**

Roux will oversee all invasive work and the excavation and load-out of all excavated material. The quantity of waste is expected to be very limited and it will be containerized in drums for disposal. Loadout and trucking of bulk waste is not expected.

All work will be completed in accordance with the HASP (Appendix A). Support of excavation, though unlikely due to the nature of the work, will be provided, if necessary, based upon Site conditions and local regulations.

### **5.5 Materials Transport Off-Site**

All transport of materials (i.e., drummed soil/fill/solid waste) will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

### **5.6 Materials Disposal Off-Site**

All soil/fill/solid waste excavated and removed from the Site will be disposed of in accordance with regulatory requirements based on the levels of contamination found to be present in waste characterization samples collected.

The following documentation will be obtained and reported for each disposal location used in this project to demonstrate and document that the disposal of material derived from the Site conforms with all applicable

laws: (1) a letter or facility-specific waste profile/application from Roux or Laconia LLC to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter/profile/application will state that material to be disposed is contaminated material (if applicable) generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of Roux or Laconia LLC. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site characterization data); (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the Final Engineering Report (FER); and (3) a Contained-In Determination approval from the NYSDEC declassifying the waste as non-hazardous, unless waste characterization sampling indicates the waste is characteristically hazardous.

The FER will include an accounting of the destination of all material removed from the Site during this IRM. This information will also be presented in a tabular form in the FER.

A Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the FER.

Hazardous and non-hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable local, State, and Federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in compliance with all applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

## **5.7 Materials Reuse On-Site**

Soil reuse is not anticipated as part of the IRM.

## **5.8 Fluids Management**

Liquids (if any) to be removed from the Site will be handled, transported and disposed in accordance with applicable laws and regulations. Liquid waste manifests will be reported to NYSDEC in the FER.

Characterization of fluids for off-Site disposal will be performed in a manner suitable to the receiving facility and in conformance with applicable permits.

## 5.9 Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by Roux and will be in compliance with provisions in this IRM prior to receipt at the Site. Materials anticipated to be imported to the Site during implementation of this IRM/SVI Work Plan include ¾" gravel (round stone) to be used as backfill for SSDS pits.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site.

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are the lower of the protection of groundwater or the protection of public health soil cleanup objectives for Commercial or higher use as set forth in Table 375-6.8(b) of 6 NYCRR Part 375. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved IRM Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this IRM Work Plan should be construed as an approval for this purpose.

In accordance with DER-10, the following material may be imported, without chemical testing, to be used as backfill beneath pavement, buildings or as part of the final Site cover, provided that it contains less than 10% by weight material which would pass through a size 10 sieve and consists of:

- Gravel, rock or stone, consisting of virgin material from a NYSDEC permitted mine or quarry; or
- Recycled concrete or brick from a NYSDEC registered construction and demolition debris processing facility if the material conforms to the requirements of Section 304 of the New York State Department of Transportation *Standard Specifications Construction and Materials Volume 1* (2002).

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

## 5.10 Stormwater Pollution Prevention

Although disturbance of soil outside the building footprint is not expected to be part of the scope, if changes to the scope require soil disturbance outside the building footprint, applicable laws and regulations pertaining to stormwater pollution prevention will be addressed. If necessary, erosion and sediment control measures (silt fences and/or barriers, and/or hay bale checks) will be installed, as appropriate, around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs to erosion and sediment controls shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt



fence anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

### **5.11 Contingency Plan**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during implementation of the IRM. Due to the nature of the proposed work, discovery of previously unknown USTs is extremely unlikely.

If previously unidentified contaminant sources are found during implementation of the IRM, sampling will be performed on potentially contaminated source material and surrounding soils and reported to NYSDEC. Chemical analytical work will be for full suite of parameters (target compound list [TCL] VOCs, TCL semivolatile organic compounds [SVOCs], target analyte list [TAL] metals, TCL polychlorinated biphenyls [PCBs], pesticides and herbicides).

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

### **5.12 Community Air Monitoring Plan (CAMP)**

CAMP will be implemented, in accordance with the Generic CAMP procedures included in Appendix F of the HASP (Appendix A), during all invasive activities to minimize the potential for tenant exposure from potentially contaminated soil and soil vapor. Roux will provide ambient air quality monitoring for VOCs and particulates during all invasive Site activities. CAMP monitoring data will be included in daily reports (see Section 5.1). Action level exceedances will be reported to Laconia LLC project manager and appropriate communication and action taken. If an action limit report is generated due to VOC exceedances, the NYSDEC and NYSDOH will be notified within 24 hours of the exceedance. Health and safety monitoring for workers will be performed in accordance with the HASP.

### **5.13 Odor, Dust and Nuisance Control Plan**

The FER will include the following certification by the certifying professional engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the IRM/SVI Work Plan."

#### **5.13.1 Odor Control Plan**

In addition to the health and safety monitoring described in the HASP (Appendix A), Roux will closely monitor the presence of odors emanating from the work area within the building. Compliance with this odor control plan is capable of controlling emissions of nuisance odors on-Site. Due to the nature of the project, with all intrusive work occurring in the basement of the existing building, nuisance odor will not be generated at the

sidewalk level surrounding the Site. The HASP will contain specific measures to address potential worker exposure to airborne contaminants during the IRM implementation. Specific odor control methods to be used on a routine basis will include limiting open excavation areas, keeping excavations covered, and covering excavated soil (i.e., in covered drums). If nuisance odors are identified, work will be halted, and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of Roux, who is responsible for certifying the FER and its subcontractors.

Odor controls will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of odor suppressants to cover exposed odorous soils.

#### **5.13.2 Dust Control Plan**

Due to the nature of the project, with excavation occurring in the basement of the existing building, generation of nuisance dust at the sidewalk level surrounding the Site will not occur. The HASP will contain specific measures to address potential worker exposure to airborne particulates during the IRM implementation. A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of water for wetting excavation areas. Water will be available on-Site at suitable supply and pressure for use in dust control.

#### **5.13.3 Other Nuisances**

Noise control will be exercised during the remedial program.

## **6. Reporting**

### **6.1 Daily Reporting During Site Activities**

Daily reports to NYSDEC and NYSDOH will be submitted during the days when IRM activities take place. Daily reports will include an update of progress made during the reporting period; locations of work and quantities of material imported and exported from the Site; a summary of any and all complaints with relevant details (names, phone numbers); a summary of CAMP readings, and an explanation of notable Site conditions, etc. If any issues arise (i.e., issues with the CAMP), NYSDOH and NYSDEC will be notified within 24 hours.

### **6.2 Final Engineering Report (FER)**

Detailed information regarding the IRM (e.g., general description of the construction activities, as-built of the SSDS, waste disposal documentation, backfill documentation, photographs, etc.) will be included in the FER.

# 7. IRM/SVI Implementation Schedule

This IRM/SVI Work Plan is anticipated to begin in the first quarter of 2020 and will require approximately four to six weeks to complete. It is anticipated that the actual on-Site duration of major remedial construction tasks will be completed as follows (time frames are not necessarily consecutive):

- SVI Investigation Field Activities ..... three days
- Site Mobilization and Preparation ..... one day
- SSDS Installation ..... four to five weeks
- SSDS Startup and Testing ..... two days
- Transportation and Off-Site Disposal ..... one day
- Site Restoration and Demobilization ..... one day
- Submittal of FER After Startup and Testing Completed ..... To Be Determined

**Interim Remedial Measures Work Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**TABLE**

Summary of Volatile Organic Compounds in  
Air and Soil Vapor

Notes Utilized Throughout Tables	
<b>Soil Vapor/Ambient Air</b>	
J -	Estimated value
U -	Indicates that the compound was analyzed for but not detected
DUP -	Duplicate sample
ug/m3 -	Micrograms per cubic meter
Bold data indicates that parameter was detected	

**Table 1. Summary of Volatile Organic Compounds in Soil Vapor, 4125-4129 Laconia Avenue, Bronx, New York**

Sample Designation:		RSS-1	RIA-1	RIA-3	RSS-3	RSS-5	RIA-4	RSS-6	RIA-5	RSS-4
Sample Date:		10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019
Parameter	Units									
1,1,1-Trichloroethane (TCA)	ug/m3	24800 U	<b>0.196</b>	0.109 U	6.49 U	1.82 U	0.109 U	1.09 U	0.109 U	10.9 U
1,1,2,2-Tetrachloroethane	ug/m3	31200 U	1.37 U	1.37 U	8.17 U	2.29 U	1.37 U	1.37 U	1.37 U	13.7 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/m3	34900 U	1.53 U	1.53 U	9.12 U	2.55 U	1.53 U	1.53 U	1.53 U	15.3 U
1,1,2-Trichloroethane	ug/m3	24800 U	1.09 U	1.09 U	6.49 U	1.82 U	1.09 U	1.09 U	1.09 U	10.9 U
1,1-Dichloroethane	ug/m3	18400 U	0.809 U	0.809 U	4.82 U	1.35 U	0.809 U	0.809 U	0.809 U	8.09 U
1,1-Dichloroethene	ug/m3	18000 U	0.079 U	0.079 U	4.72 U	1.32 U	0.079 U	0.793 U	0.079 U	<b>8.52</b>
1,2,4-Trichlorobenzene	ug/m3	33800 U	1.48 U	1.48 U	8.83 U	2.47 U	1.48 U	1.48 U	1.48 U	14.8 U
1,2,4-Trimethylbenzene	ug/m3	22400 U	0.983 U	0.983 U	5.85 U	<b>2.08</b>	<b>3.51</b>	<b>2.35</b>	<b>3.77</b>	9.83 U
1,2-Dibromoethane (Ethylene Dibromide)	ug/m3	35000 U	1.54 U	1.54 U	9.15 U	2.56 U	1.54 U	1.54 U	1.54 U	15.4 U
1,2-Dichlorobenzene	ug/m3	27400 U	1.2 U	1.2 U	7.15 U	2 U	1.2 U	1.2 U	1.2 U	12 U
1,2-Dichloroethane	ug/m3	18400 U	0.809 U	0.809 U	4.82 U	1.35 U	0.809 U	0.809 U	0.809 U	8.09 U
1,2-Dichloropropane	ug/m3	21000 U	0.924 U	0.924 U	5.5 U	1.54 U	0.924 U	0.924 U	0.924 U	9.24 U
1,2-Dichlorotetrafluoroethane	ug/m3	31800 U	1.4 U	1.4 U	8.32 U	2.33 U	1.4 U	1.4 U	1.4 U	14 U
1,3,5-Trimethylbenzene (Mesitylene)	ug/m3	22400 U	0.983 U	0.983 U	5.85 U	1.64 U	<b>1.31</b>	0.983 U	<b>1.42</b>	9.83 U
1,3-Butadiene	ug/m3	10100 U	0.442 U	0.442 U	2.63 U	0.737 U	<b>1.43</b>	0.442 U	<b>1.38</b>	4.42 U
1,3-Dichlorobenzene	ug/m3	27400 U	1.2 U	1.2 U	7.15 U	2 U	1.2 U	1.2 U	1.2 U	12 U
1,4-Dichlorobenzene	ug/m3	27400 U	1.2 U	1.2 U	7.15 U	2 U	1.2 U	1.2 U	<b>1.26</b>	12 U
1,4-Dioxane (P-Dioxane)	ug/m3	16400 U	0.721 U	0.721 U	4.29 U	1.2 U	0.721 U	0.721 U	0.721 U	7.21 U
2,2,4-Trimethylpentane	ug/m3	<b>1650000</b>	<b>2.7</b>	<b>1.22</b>	5.56 U	1.56 U	<b>1.84</b>	<b>1.22</b>	<b>2.69</b>	9.34 U
2-Hexanone	ug/m3	18600 U	0.82 U	0.82 U	4.88 U	1.36 U	0.82 U	0.82 U	0.82 U	8.2 U
4-Ethyltoluene	ug/m3	22400 U	0.983 U	0.983 U	5.85 U	1.64 U	<b>1.21</b>	0.983 U	<b>1.72</b>	9.83 U
Acetone	ug/m3	53900 U	<b>4.09</b>	<b>6.98</b>	<b>16.8</b>	<b>26.1</b>	<b>206</b>	<b>24</b>	<b>215</b>	23.8 U
Allyl Chloride (3-Chloropropene)	ug/m3	14200 U	0.626 U	0.626 U	3.72 U	1.04 U	0.626 U	0.626 U	0.626 U	6.26 U
Benzene	ug/m3	<b>24400</b>	<b>0.776</b>	0.639 U	3.8 U	<b>3.19</b>	<b>9.58</b>	<b>2.71</b>	<b>10.1</b>	6.39 U
Benzyl Chloride	ug/m3	23600 U	1.04 U	1.04 U	6.16 U	1.72 U	1.04 U	1.04 U	1.04 U	10.4 U
Bromodichloromethane	ug/m3	30500 U	1.34 U	1.34 U	7.97 U	2.23 U	1.34 U	1.34 U	1.34 U	13.4 U
Bromoform	ug/m3	47000 U	2.07 U	2.07 U	12.3 U	3.44 U	2.07 U	2.07 U	2.07 U	20.7 U
Bromomethane	ug/m3	17700 U	0.777 U	0.777 U	4.62 U	1.29 U	0.777 U	0.777 U	0.777 U	7.77 U
Carbon Disulfide	ug/m3	14200 U	0.623 U	0.623 U	3.71 U	1.04 U	0.623 U	<b>1.3</b>	0.623 U	6.23 U
Carbon Tetrachloride	ug/m3	28600 U	<b>0.453</b>	<b>0.465</b>	7.49 U	2.09 U	<b>0.629</b>	1.26 U	<b>0.61</b>	12.6 U
Chlorobenzene	ug/m3	21000 U	0.921 U	0.921 U	5.48 U	1.53 U	0.921 U	0.921 U	0.921 U	9.21 U
Chloroethane	ug/m3	12000 U	0.528 U	0.528 U	3.14 U	0.879 U	0.528 U	0.528 U	0.528 U	5.28 U
Chloroform	ug/m3	22200 U	0.977 U	0.977 U	<b>286</b>	<b>14.4</b>	<b>8.25</b>	<b>67.9</b>	<b>10.4</b>	<b>15.4</b>
Chloromethane	ug/m3	9400 U	<b>1.04</b>	<b>1.04</b>	2.46 U	<b>0.995</b>	<b>1.5</b>	0.413 U	<b>1.44</b>	4.13 U
Cis-1,2-Dichloroethylene	ug/m3	18000 U	0.079 U	0.079 U	<b>28.5</b>	<b>95.9</b>	<b>0.424</b>	<b>3.68</b>	<b>0.448</b>	<b>484</b>
Cis-1,3-Dichloropropene	ug/m3	20700 U	0.908 U	0.908 U	5.4 U	1.51 U	0.908 U	0.908 U	0.908 U	9.08 U
Cyclohexane	ug/m3	<b>186000</b>	0.688 U	0.688 U	4.1 U	1.15 U	<b>0.688</b>	0.688 U	<b>1.04</b>	6.88 U
Dibromochloromethane	ug/m3	38800 U	1.7 U	1.7 U	10.1 U	2.84 U	1.7 U	1.7 U	1.7 U	17 U

**Table 1. Summary of Volatile Organic Compounds in Soil Vapor, 4125-4129 Laconia Avenue, Bronx, New York**

Sample Designation:		RSS-1	RIA-1	RIA-3	RSS-3	RSS-5	RIA-4	RSS-6	RIA-5	RSS-4
Sample Date:		10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019	10/08/2019
Parameter	Units									
Dichlorodifluoromethane	ug/m3	22500 U	1.87	1.88	5.88 U	2.8	2.08	5.24	2.06	9.89 U
Ethanol	ug/m3	215000 U	328	262	56.2 U	98.5	330	266	347	94.2 U
Ethyl Acetate	ug/m3	41100 U	1.8 U	1.8 U	10.7 U	3.01 U	12.6	5.05	12.6	18 U
Ethylbenzene	ug/m3	19800 U	0.869 U	0.869 U	5.17 U	8.38	17.2	9.38	19.6	8.69 U
Hexachlorobutadiene	ug/m3	48500 U	2.13 U	2.13 U	12.7 U	3.55 U	2.13 U	2.13 U	2.13 U	21.3 U
Isopropanol	ug/m3	28000 U	3.37	6.74	18.4	23.2	67.8	19.3	64.4	14.9
m,p-Xylene	ug/m3	39500 U	1.87	1.74 U	10.4 U	9.9	17.7	11.4	20.5	17.4 U
Methyl Ethyl Ketone (2-Butanone)	ug/m3	33600 U	1.47 U	1.47 U	8.79 U	7.52	25.2	7.28	26.7	14.7 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	ug/m3	46700 U	2.05 U	2.05 U	12.2 U	3.42 U	2.05 U	2.05 U	2.05 U	20.5 U
Methylene Chloride	ug/m3	39600 U	1.74 U	1.74 U	10.4 U	2.9 U	1.74 U	1.74 U	1.74 U	17.4 U
N-Heptane	ug/m3	259000	1.73	1.48	4.88 U	1.67	4.79	2.22	5.37	8.2 U
N-Hexane	ug/m3	1820000	1.49	1.03	4.19 U	1.17 U	3.36	0.93	4.79	7.05 U
O-Xylene (1,2-Dimethylbenzene)	ug/m3	19800 U	0.869	0.869 U	5.17 U	1.9	2.68	2.11	3.19	8.69 U
Styrene	ug/m3	19400 U	0.852 U	0.852 U	5.07 U	1.42 U	1.29	0.852 U	1.38	8.52 U
Tert-Butyl Alcohol	ug/m3	34600 U	1.52 U	1.52 U	9.03 U	3.09	1.52 U	2.59	1.52 U	15.2 U
Tert-Butyl Methyl Ether	ug/m3	16400 U	0.721 U	0.721 U	4.29 U	1.2 U	0.721 U	0.721 U	0.721 U	7.21 U
Tetrachloroethylene (PCE)	ug/m3	30900 U	3.16	1.95	2200	692	15.1	208	14.8	3890
Tetrahydrofuran	ug/m3	33600 U	1.47 U	1.47 U	8.79 U	2.46 U	1.47 U	1.47 U	1.47 U	14.7 U
Toluene	ug/m3	17100 U	2.43	2.05	5.73	5.24	6.56	6.37	8.93	7.54 U
Trans-1,2-Dichloroethene	ug/m3	18000 U	0.793 U	0.793 U	6.82	14.5	0.793 U	0.793 U	0.793 U	1290
Trans-1,3-Dichloropropene	ug/m3	20700 U	0.908 U	0.908 U	5.4 U	1.51 U	0.908 U	0.908 U	0.908 U	9.08 U
Trichloroethylene (TCE)	ug/m3	24500 U	0.14	0.107 U	392	377	2.48	58	2.39	2330
Trichlorofluoromethane	ug/m3	25600 U	1.12 U	1.12 U	6.69 U	1.87 U	1.24	1.31	1.21	11.2 U
Vinyl Bromide	ug/m3	19900 U	0.874 U	0.874 U	5.2 U	1.46 U	0.874 U	0.874 U	0.874 U	8.74 U
Vinyl Chloride	ug/m3	11600 U	0.051 U	0.051 U	3.04 U	9.38	0.051 U	0.511 U	0.051 U	5.11 U



**Table 1. Summary of Volatile Organic Compounds in Soil Vapor, 4125-4129 Laconia Avenue, Bronx, New York**

Sample Designation:		AA-1	RSS-2	RIA-2	RIA-2 DUP
Sample Date:		10/08/2019	10/08/2019	10/08/2019	10/08/2019
Parameter	Units				
1,1,1-Trichloroethane (TCA)	ug/m3	0.109 U	1.09 U	<b>0.256</b>	<b>0.295</b>
1,1,2,2-Tetrachloroethane	ug/m3	1.37 U	1.37 U	1.37 U	1.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/m3	1.53 U	1.53 U	1.53 U	1.53 U
1,1,2-Trichloroethane	ug/m3	1.09 U	1.09 U	1.09 U	1.09 U
1,1-Dichloroethane	ug/m3	0.809 U	0.809 U	0.809 U	0.809 U
1,1-Dichloroethene	ug/m3	0.079 U	0.793 U	0.079 U	0.079 U
1,2,4-Trichlorobenzene	ug/m3	1.48 U	1.48 U	1.48 U	1.48 U
1,2,4-Trimethylbenzene	ug/m3	0.983 U	<b>2.85</b>	<b>1.93</b>	<b>1.97</b>
1,2-Dibromoethane (Ethylene Dibromide)	ug/m3	1.54 U	1.54 U	1.54 U	1.54 U
1,2-Dichlorobenzene	ug/m3	1.2 U	1.2 U	<b>1.82</b>	<b>1.85</b>
1,2-Dichloroethane	ug/m3	0.809 U	0.809 U	0.809 U	0.809 U
1,2-Dichloropropane	ug/m3	0.924 U	0.924 U	0.924 U	0.924 U
1,2-Dichlorotetrafluoroethane	ug/m3	1.4 U	1.4 U	1.4 U	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	ug/m3	0.983 U	0.983 U	0.983 U	0.983 U
1,3-Butadiene	ug/m3	0.442 U	0.442 U	0.442 U	0.442 U
1,3-Dichlorobenzene	ug/m3	1.2 U	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	ug/m3	1.2 U	1.2 U	<b>1.26</b>	<b>1.26</b>
1,4-Dioxane (P-Dioxane)	ug/m3	0.721 U	0.721 U	0.721 U	0.721 U
2,2,4-Trimethylpentane	ug/m3	0.934 U	<b>1.81</b>	<b>3.68</b>	<b>3.8</b>
2-Hexanone	ug/m3	0.82 U	0.82 U	0.82 U	0.82 U
4-Ethyltoluene	ug/m3	0.983 U	0.983 U	0.983 U	0.983 U
Acetone	ug/m3	<b>4.13</b>	<b>21</b>	<b>5.06</b>	<b>4.28</b>
Allyl Chloride (3-Chloropropene)	ug/m3	0.626 U	0.626 U	0.626 U	0.626 U
Benzene	ug/m3	0.639 U	<b>0.68</b>	<b>1.09</b>	<b>1.12</b>
Benzyl Chloride	ug/m3	1.04 U	1.04 U	1.04 U	1.04 U
Bromodichloromethane	ug/m3	1.34 U	<b>4.22</b>	1.34 U	1.34 U
Bromoform	ug/m3	2.07 U	2.07 U	2.07 U	2.07 U
Bromomethane	ug/m3	0.777 U	0.777 U	0.777 U	0.777 U
Carbon Disulfide	ug/m3	0.623 U	<b>1.31</b>	0.623 U	0.623 U
Carbon Tetrachloride	ug/m3	<b>0.403</b>	1.26 U	<b>0.421</b>	<b>0.472</b>
Chlorobenzene	ug/m3	0.921 U	0.921 U	0.921 U	0.921 U
Chloroethane	ug/m3	0.528 U	0.528 U	0.528 U	0.528 U
Chloroform	ug/m3	0.977 U	<b>316</b>	<b>2.47</b>	<b>2.48</b>
Chloromethane	ug/m3	<b>1.01</b>	0.413 U	<b>1.05</b>	<b>1.06</b>
Cis-1,2-Dichloroethylene	ug/m3	0.079 U	0.793 U	<b>0.083</b>	<b>0.083</b>
Cis-1,3-Dichloropropene	ug/m3	0.908 U	0.908 U	0.908 U	0.908 U
Cyclohexane	ug/m3	0.688 U	0.688 U	<b>1.04</b>	<b>1.09</b>
Dibromochloromethane	ug/m3	1.7 U	1.7 U	1.7 U	1.7 U

**Table 1. Summary of Volatile Organic Compounds in Soil Vapor, 4125-4129 Laconia Avenue, Bronx, New York**

Sample Designation:		AA-1	RSS-2	RIA-2	RIA-2 DUP
Sample Date:		10/08/2019	10/08/2019	10/08/2019	10/08/2019
Parameter	Units				
Dichlorodifluoromethane	ug/m3	<b>1.94</b>	<b>2.57</b>	<b>2.09</b>	<b>2.05</b>
Ethanol	ug/m3	9.42 U	<b>196</b>	<b>12.1</b>	<b>12.6</b>
Ethyl Acetate	ug/m3	1.8 U	<b>5.08</b>	1.8 U	1.8 U
Ethylbenzene	ug/m3	0.869 U	<b>1.85</b>	<b>1.46</b>	<b>1.47</b>
Hexachlorobutadiene	ug/m3	2.13 U	2.13 U	2.13 U	2.13 U
Isopropanol	ug/m3	1.23 U	<b>22.3</b>	<b>5.53</b>	<b>5.95</b>
m,p-Xylene	ug/m3	1.74 U	<b>4.78</b>	<b>4.31</b>	<b>4.52</b>
Methyl Ethyl Ketone (2-Butanone)	ug/m3	1.47 U	<b>6.61</b>	1.47 U	1.47 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	ug/m3	2.05 U	<b>2.64</b>	2.05 U	2.05 U
Methylene Chloride	ug/m3	1.74 U	<b>3.13</b>	<b>12.1</b>	<b>12.4</b>
N-Heptane	ug/m3	0.82 U	<b>1.33</b>	<b>1.82</b>	<b>1.9</b>
N-Hexane	ug/m3	0.705 U	<b>0.973</b>	<b>3.84</b>	<b>3.98</b>
O-Xylene (1,2-Dimethylbenzene)	ug/m3	0.869 U	<b>1.94</b>	<b>1.73</b>	<b>1.8</b>
Styrene	ug/m3	0.852 U	0.852 U	0.852 U	0.852 U
Tert-Butyl Alcohol	ug/m3	1.52 U	<b>3.18</b>	1.52 U	1.52 U
Tert-Butyl Methyl Ether	ug/m3	0.721 U	0.721 U	0.721 U	0.721 U
Tetrachloroethylene (PCE)	ug/m3	<b>0.251</b>	<b>266</b>	<b>27.8</b>	<b>28.2</b>
Tetrahydrofuran	ug/m3	1.47 U	<b>3.07</b>	1.47 U	<b>2.9</b>
Toluene	ug/m3	<b>0.769</b>	<b>6.97</b>	<b>5.16</b>	<b>5.28</b>
Trans-1,2-Dichloroethene	ug/m3	0.793 U	0.793 U	0.793 U	0.793 U
Trans-1,3-Dichloropropene	ug/m3	0.908 U	0.908 U	0.908 U	0.908 U
Trichloroethylene (TCE)	ug/m3	0.107 U	<b>3.74</b>	<b>0.666</b>	<b>0.683</b>
Trichlorofluoromethane	ug/m3	1.12 U	<b>2.46</b>	<b>2.28</b>	<b>2.35</b>
Vinyl Bromide	ug/m3	0.874 U	0.874 U	0.874 U	0.874 U
Vinyl Chloride	ug/m3	0.051 U	0.511 U	0.051 U	0.051 U

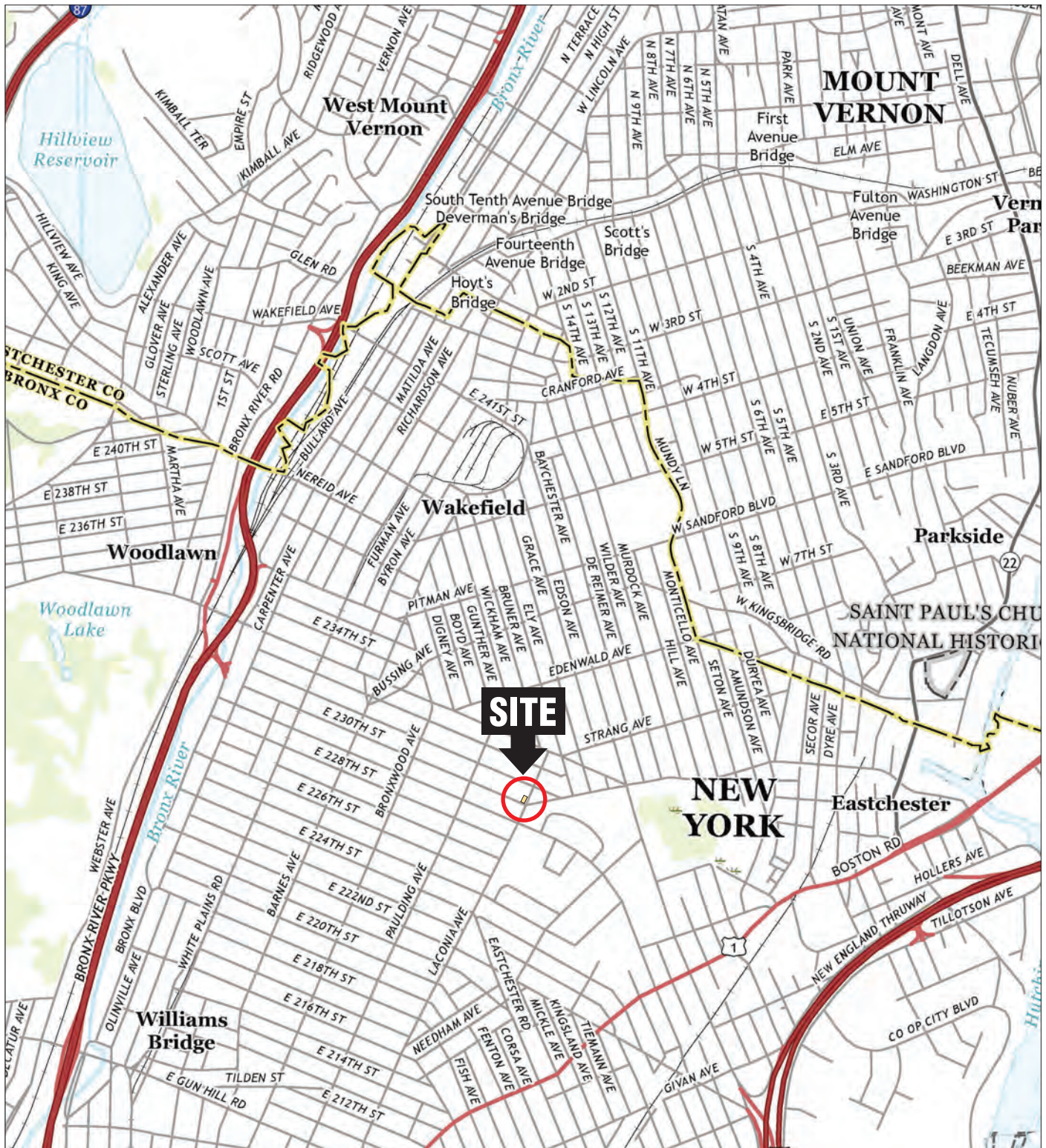
**Interim Remedial Measures Work Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**FIGURES**

1. Site Location Map
2. Site Plan and Sample Locations

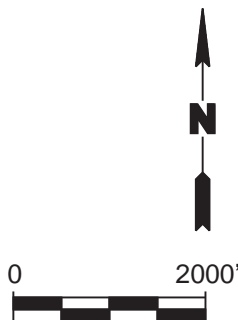




QUADRANGLE LOCATION



SOURCE:  
USGS; 2016, Mount Vernon, NY  
7.5 Minute Topographic Quadrangle



Title:

## SITE LOCATION MAP

4125-4149 LACONIA AVENUE  
BRONX, NEW YORK

Prepared for:

LACONIA PROPERTIES

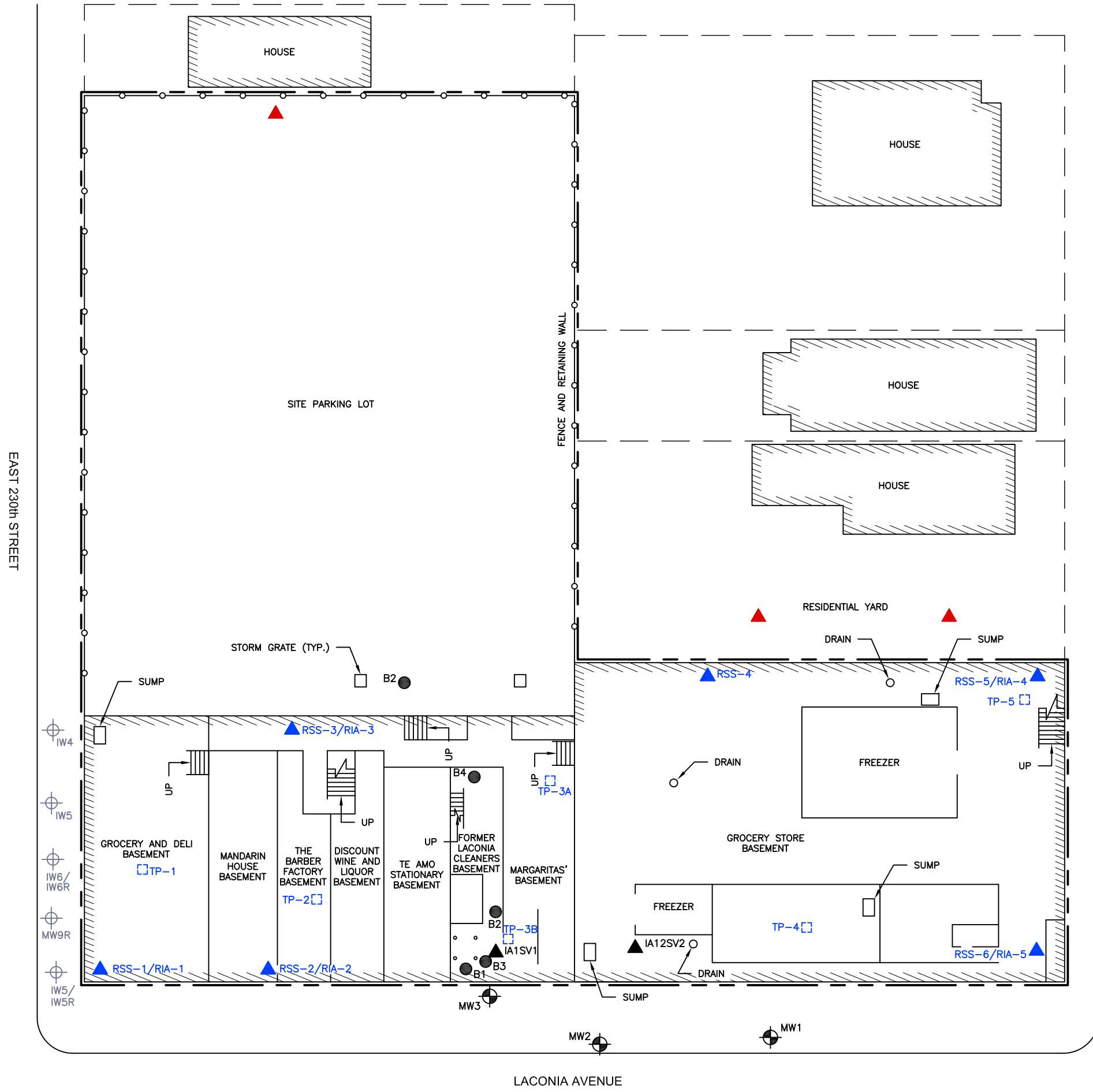
**ROUX**

Compiled by: J.W.	Date: 13SEP19
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: J.W.	Project: 3390.0001Y000
File: 3390.0001Y100.01.CDR	

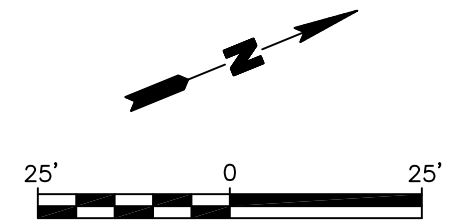
FIGURE

1

V:\CAD\PROJECTS\3390\Y0001Y104\3390.0001Y104.01.DWG



- LEGEND
- PROPERTY BOUNDARY
  - MW1 (Symbol) APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL INSTALLED BY MERRITT ENVIRONMENTAL IN 2019
  - IW4 (Symbol) APPROXIMATE LOCATION AND DESIGNATION OF EXISTING INSPECTION AND/OR MONITORING WELL INSTALLED BY OTHERS
  - B1 (Symbol) APPROXIMATE LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY MERRITT ENVIRONMENTAL
  - IA1 SV1 (Symbol) APPROXIMATE LOCATION AND DESIGNATION OF INDOOR AIR AND SUB SLAB SOIL VAPOR SAMPLE LOCATION INSTALLED BY MERRITT ENVIRONMENTAL
  - RSS-1/RIA-1 (Symbol) APPROXIMATE LOCATION AND DESIGNATION OF SUB SLAB SOIL VAPOR AND INDOOR AIR SAMPLE COLLECTED BY ROUX
  - TP-1 (Symbol) APPROXIMATE LOCATION AND DESIGNATION OF EXPLORATORY TEST PIT (ONE FOOT LONG BY ONE FOOT WIDE) INSTALLED BY ROUX
  - ▲ PROPOSED LOCATION OF SOIL VAPOR SAMPLE
  - ○ APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE SUPPORT COLUMNS (BASEMENT)



Title: <b>SITE PLAN AND SAMPLE LOCATIONS</b>			
4125-4149 LACONIA AVENUE BRONX, NEW YORK			
Prepared for: <b>LACONIA PROPERTIES LLC</b>			
	Compiled by: J.W.	Date: 18OCT19	FIGURE <b>2</b>
	Prepared by: G.M.	Scale: AS SHOWN	
	Project Mgr: J.W.	Project: 3390.0001Y000	
	File: 3390.0001Y104.01.DWG		



**APPENDICES**

- A. Health and Safety Plan
- B. Sub-Slab Depressurization System Design Drawings
- C. Sub-Slab Depressurization System Component Specifications
- D. Sub-Slab Depressurization System Operations and Maintenance Log
- E. Sub-Slab Soil Vapor, Indoor Air and Outdoor Air Sample Analysis (Merritt, January 2019)

**Interim Remedial Measures Work Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**APPENDIX A**

Health and Safety Plan



# Site-Specific Health and Safety Plan

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4125-4149 Laconia Avenue  
Bronx, New York

December 13, 2019

Prepared for:

**Laconia Properties LLC**  
**c/o Ditmars Real Estate Consultants**  
30-29 Steinway Street  
Astoria, New York 11103

Prepared by:

**Roux Environmental Engineering  
and Geology, D.P.C.**  
209 Shafter Street  
Islandia, New York 11749



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2. Site Plan with Emergency Muster Area
3. Route to Hospital
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- A. Job Safety Analysis (JSA) Forms
- B. SDSs for Chemicals Used
- C. Personal Protective Equipment (PPE) Management Program
- D. Subsurface Utility Clearance Management Program
- E. Heavy Equipment Exclusion Zone Policy
- F. Generic Community Air Monitoring Plan

# Site-Specific Emergency Information

## Emergency Phone Numbers

Most emergency services can be obtained by calling **911**. Where 911 service is not available, use the telephone numbers provided in the below table. The following is a master emergency phone list for use by the project management personnel. A more condensed version of the emergency numbers listed below will be posted throughout project work areas. Emergencies encountered on the site will be responded to by a combination of off-site emergency services and site personnel.

Emergency Contact Information			
Site Personnel			
Title	Contact	Telephone	
Project Manager (PM)	Jeff Wills	(516) 637-0213	
Site Health and Safety Officer (SHSO)	Levi Curnutte	(727) 743-0304	
Site Supervisor	George Kondos	(917) 744-5901	
SHSO Alternate	TBD		
Client Emergency Contact	George Kondos	(917) 744-5901	
Outside Assistance			
Agency	Contact	Telephone	Address/Location
Ambulance/EMS	47 <sup>th</sup> Precinct	911	4111 Laconia Ave, Bronx, NY
Police	47 <sup>th</sup> Precinct	911	4111 Laconia Ave, Bronx, NY
Fire	FDNY	(718) 999-2681	3446 Eastchester Rd, Bronx, NY

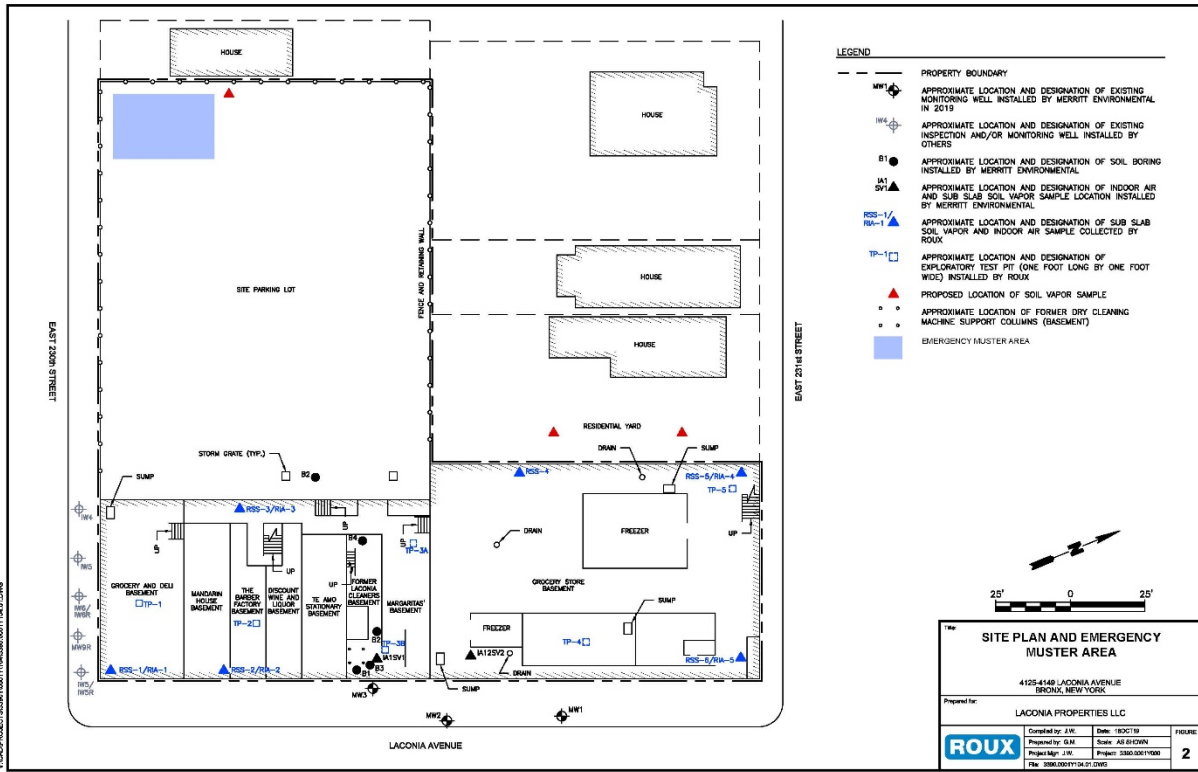
### Route to Hospital: Montefiore Medical Center (Figure 3)

- Head north on Laconia Ave toward E 231st St - 0.1 miles
- Turn left onto E 233rd St (Pass by Carvel [on the left]) - 0.8 miles
- Turn left onto Carpenter Ave - 98 feet
- Turn right (destination will be on the left)

### Route to Urgent Care Facility: Urgent Care of New York (Figure 4)

- Head north on Laconia Ave toward E 231st St - 0.1 miles
- Turn left onto E 233rd St (Pass by Carvel [on the left]) - 1.2 miles
- Turn right onto Katonah Ave - 0.4 miles
- Slight right onto Van Cortlandt Park E - 243 feet
- Continue onto Kimball Ave - 249 feet
- Turn left onto Cox Ave (destination will be on the right) - 62 feet

# Emergency Response Site Map



# 1. Introduction

This Site-specific Health and Safety Plan (HASP) has been prepared by Roux Environmental Engineering and Geology, D.P.C. (Roux) for use during the sampling and remedial activities being performed by Roux at the Laconia Properties LLC site (“the Site”), located at 4125-4149 Laconia Avenue, Bronx, New York (see Figure 1). These activities fall within the scope of operations covered by the Occupational Safety and Health Administration (OSHA) standards promulgated at 29 CFR 1910.120 and 29 CFR 1926.65, both commonly referred to as the Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard. In accordance with the HAZWOPER Standard, this Site-specific HASP was prepared to address the safety and health hazards associated with the sampling and remedial activities being performed at the Site by Roux and to provide requirements and procedures for the protection of Roux employees, subcontractor personnel, government oversight personnel, Site personnel, and the general public. It also addresses client- and Site-specific requirements for health and safety.

Implementation of this HASP is the joint responsibility of the Project Manager (PM), the Site Health and Safety Officer (SHSO), and all field staff, with assistance from the Project Principal (PP), Office Health and Safety Manager (OHSM), and Corporate Health and Safety Manager (CHSM). The PM for this project is Jeff Wills. The Site Supervisor (SS) is George Kondos and Site Health and Safety Officer (SHSO) is Levi Curnutte.

This HASP will be introduced to, reviewed, and signed off on by all Roux personnel through a formal training session prior to commencing work. A copy of the HASP will be kept at the Site at all times. The Roux SHSO or PM will be responsible for posting any changes, amendments, memos, etc. to the HASP. Any revisions to this HASP will be signed by appropriate personnel, which can include Roux’s PP, CHSM, and SS. Any changes will be announced to all workers at the next safety meeting.

## 1.1 Roles and Responsibilities

Overall Roles and Responsibilities (R&Rs) of Roux personnel are provided in Roux’s Policies and Procedures Manual. Only those R&Rs specific to HASP requirements are listed below.

### Project Manager (PM)

The PM has responsibility and authority to direct all work operations. The PM coordinates safety and health functions with the Site Health and Safety Officer (SHSO), has the authority to oversee and monitor the performance of the SHSO, and bears ultimate responsibility for the proper implementation of this HASP. The specific duties of the PM are:

- preparing and coordinating the Site work plan;
- providing Site supervisor(s) with work assignments and overseeing their performance; Coordinating safety and health efforts with the SHSO;
- ensuring effective emergency response through coordination with the Emergency Response Coordinator (ERC);
- serving as primary Site liaison with public agencies and officials and Site contractors.

### Site Health and Safety Officer (SHSO)

The SHSO has full responsibility and authority to develop and implement this HASP and to verify compliance. The SHSO reports to the Project Manager. The SHSO is on Site or readily accessible to the Site during all

work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SHSO include:

- managing the safety and health functions on this Site;
- serving as the Site's point of contact for safety and health matters;
- ensuring Site monitoring, worker training, and effective selection and use of PPE;
- assessing Site conditions for unsafe acts and conditions and providing corrective action;
- assisting the preparation and review of this HASP;
- maintaining effective safety and health records as described in this HASP;
- coordinating with the Site Supervisor(s) and others as necessary for safety and health efforts.

### **Site Supervisor**

The Site Supervisor is responsible for field operations and reports to the Project Manager (PM). The Site Supervisor ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor include:

- executing the work plan and schedule as detailed by the PM;
- coordination with the SHSO on safety and health; and
- ensuring Site work compliance with the requirements of this HASP.

### **Employees**

All Roux employees are responsible for reading and following all provisions of the Corporate Health and Safety Manual, including this HASP. Employees report to the SS at the project Site. Each employee is also responsible for the following:

- wearing all appropriate PPE as outlined within this HASP;
- attending all safety meetings;
- inspecting tools and equipment prior to use, and taking any defective tools or equipment out of service;
- appropriately documenting field events as they occur within a logbook or equivalent;
- properly operating machinery and/or equipment only if trained to do so;
- stopping work operations if unsafe conditions exist;
- identifying and mitigating hazards when observed;
- reporting all incidents and near misses to the Roux SHSO and SS immediately;
- knowing where emergency equipment is located (e.g. first aid kit, fire extinguisher).

### **Subcontractors and Visitors**

Subcontractors and visitors are responsible for complying with the same health and safety requirements. It is the responsibility of all to make sure subcontractors and visitors comply and uphold the HASP. Subcontractors and visitors have the following additional responsibilities:

- designating a qualified safety representative for the project that can make the necessary changes in work practices, as necessary;
- attending all safety meetings while participating in Roux Site work activities;

- reporting all incidents and near misses to Roux SHSO and SS immediately;
- conducting initial and periodic equipment inspections in accordance with manufacturer and regulatory guidelines;
- providing copies of all Safety Data Sheets (SDS) to Roux SHSO for materials brought to the Site.

## **2. Background**

Relevant background information is provided below, including a general description of the Site; a brief review of the Site's history with respect to hazardous material use, handling, and/or storage; and a review of known and potential releases of hazardous substances at the Site.

### **2.1 Site Description**

The Site is the location of the former Laconia Avenue Cleaners. The Site is currently occupied by eight retail facilities including a Grocery and Deli, Mandarin House Restaurant, The Baraber Factory, Discount Wine and Liquor, Edenwald Pharmacy Inc. (former Laconia Ave Cleaners), Vacant space (former Margarita's Unisex Hair Salon), and Associated Grocery Store. The Site is bounded by Laconia Avenue and a parking lot to the east, E. 231st Street and residential properties to the north, residential properties to the west, and E. 230th Street and 47th Precinct to the south. The City is performing remediation of petroleum spills at the adjacent 47th Precinct.

### **2.2 Site History**

The former Laconia Avenue Cleaner operated at the Site (identified as 4137 Laconia Avenue).

### **2.3 Known and Potential Releases of Hazardous Substances at the Site**

Previously investigations conducted by others and Roux identified chlorinated volatile organic compounds (CVOCs) including tetrachloroethene (PCE) and trichloroethene (TCE) and petroleum-related compounds (i.e., benzene, toluene, ethylbenzene and xylenes) in sub-slab soil vapor, indoor air and/or groundwater at the Site. PCE was also detected in one soil sample collected from beneath the former Laconia Avenue Cleaners. Additionally, the City is currently conducting remediation activities for petroleum-related spills at the 47th Precinct located immediately south of the Site, across E. 230th Street.



### **3. Scope of Work**

Remedial activities that will be completed at the Site include:

- Installation and sampling of soil vapor and sub-slab soil vapor monitoring points;
- Installation of exploratory test pits;
- Installation and sampling of soil borings and groundwater monitoring wells; and
- Design, installation and monitoring of a sub-slab depressurization system.

If there are any changes with the scope a revision of the HASP will be required to address any new hazards.

## 4. Site Control

This Site control program is designed to reduce the spread of hazardous substances from contaminated areas to clean areas, to identify and isolate contaminated areas of the Site, to facilitate emergency evacuation and medical care, to prevent unauthorized entry to the Site, and to deter vandalism and theft.

### 4.1 Site Map

A map of this Site, showing Site boundaries, designated work zones, and points of entry and exit is provided in Figure 2.

### 4.2 Site Access

Access to the Site is restricted to reduce the potential for exposure to its safety and health hazards. During hours of Site operation, Site entry and exit is authorized only at the points identified in Figure 2. Entry and exit at these points is controlled by the following: safety barrels and caution tape. When the Site is not operating, access to the Site is controlled by the following: locked doors.

### 4.3 Buddy System

While working in the Exclusion Zone, Site workers use the buddy system. The buddy system means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of an emergency. The responsibilities of workers using the buddy system include:

- Remaining in close visual contact with partner,
- Providing partner with assistance as needed or requested,
- Observing partner for signs of heat stress or other difficulties,
- Periodically checking the integrity of partner's PPE, and
- Notifying the Site manager or other Site personnel if emergency assistance is needed.

### 4.4 Site Communications

The following communication equipment is used to support on-site communication: cell phones and hand signals.

Hand signals will be used according to the following:

**Hand Signals**

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I'm all right, okay
Thumbs down	No, negative

A current list of emergency contact numbers is posted in the following locations: former Laconia Avenue Cleaners basement.

## **4.5 Site Work Zones**

This Site is divided into three (3) major zones, described below. These zones are characterized by the presence or absence of biological, chemical, or physical hazards and the activities performed within them. Zone boundaries are clearly marked at all times and the flow of personnel among the zones is controlled. The Site is monitored for changing conditions that may warrant adjustment of zone boundaries. Zone boundaries are adjusted as necessary to protect personnel and clean areas. Whenever boundaries are adjusted, zone markings are also changed and workers are immediately notified of the change.

### **Exclusion Zone**

The area where contamination exists is the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be delineated by orange high visibility fencing. Safety tape may be used as a secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The SHSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy (co-worker)
- Required minimum level PPE
- Medical Authorization
- Training certification
- Requirement to be in the zone

### **Contamination Reduction Zone**

A Contamination Reduction Zone (CRZ) is established between the exclusion zone and the support zone. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of personnel and equipment. The CRZ will be used for general Site entry and egress in addition to access for heavy equipment and emergency support services. Personnel are not allowed in the CRZ without:

- A buddy (co-worker)
- Appropriate PPE
- Medical authorization
- Training certification
- Requirement to be in the zone

### **Support Zone**

The Support Zone (SZ) is an uncontaminated area that will be the field support area for the Site operations. The SZ will contain staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

## 5. Job Hazard Evaluation

Roux's work at the Site is expected to entail a variety of physical, chemical, and biological hazards, all of which must be sufficiently managed to allow the work to be performed safely. Some of the hazards are Site-specific, i.e., they are associated with the nature, physical characteristics, and/or routine operation of the Site itself, while others are activity-specific, i.e., they are associated with (or arise from) the particular activity being performed. The various hazards can be grouped into the following categories:

**Caught/Crushed** – the potential to become caught in, under, between, or by an object or parts of an object, such as equipment with parts that open and close or move up and down (“pinch points”) or equipment that rotates, and the accompanying potential to have body parts cut, mangled, or crushed thereby.

**Contact** – the potential to be struck by or against moving or stationary objects that can cause physical injury, such as heavy machinery, overhead piping, moving vehicles, falling objects, and equipment (including tools and hand-held equipment) or infrastructure with the ability to cut or impale.

**Energy Sources** – the potential for bodily harm associated with energy sources, most notably electricity, but also including latent energy sources such as compressed air and equipment under tension (which when released could cause injurious contact or a fall).

**Ergonomics** – the potential for musculoskeletal injury associated with lifting/carrying, pushing/pulling, bending, reaching, and other physical activity attributable to poor body position/mechanics, repetitive motion, and/or vibration.

**Exposure** – the potential for injury/illness due to physical, chemical, or biological exposures in the work environment, including but not limited to temperature extremes, solar radiation, and noise (physical), chemical splashes and hazardous atmospheres (chemical), and animal/insect bites and poisonous plants (biological).

**Falls** – the potential to slip or trip and thus fall or drop a load, resulting in bodily injury to oneself or others

The foregoing is intended to provide Roux employees with a general awareness of the hazards involved with Site work. A more detailed review of the potential hazards associated with each specific activity planned for the Site (or ongoing activity, as the case may be) is provided in the activity-specific Job Safety Analysis (JSA) forms in Appendix A. As can be seen in the JSA forms, the hazards are identified by category per the above, and specific measures designed to mitigate/manage those hazards are also identified. In preparing the JSA forms, all categories of hazards were considered, and all anticipated potential hazards were identified to the extent possible based on the experience of the personnel preparing and reviewing the JSA forms. However, there is always the possibility for an unanticipated hazard to arise, potentially as condition change over the course of the workday. Roux personnel must maintain a continual awareness of potential hazards in the work zone, regardless of whether the hazard is identified in the JSA form. Particular attention should be paid to hazards associated with exposure to hazardous substances (see Table 1 for a listing of the hazardous substances most likely to be encountered in environmental media at the Site) and to Site personnel being located “in the line of fire” with respect to moving equipment, pinch points, and latent energy, e.g., being located or having body parts located within the swing radius of an excavator, between two sections of pipe being connected, below a piece of suspended equipment, or adjacent to a compressed air line.

### 5.1 Hazard Communication and Overall Site Information Program

The information in the JSAs and safety data sheets is made available to all employees and subcontractors who could be affected by it prior to the time they begin their work activities. Modifications to JSAs are communicated during routine pre-work briefings.

The information in the JSAs and Safety Data Sheets (SDSs) is made available to all employees and subcontractors who could be affected by an exposure to the hazards covered in them prior to the time they begin their work activities. Modifications to JSAs are communicated during routine pre-work briefings, and periodically updated as needed in the HASP. SDSs will be maintained by the SHSO/SS for new chemicals brought on-site as needed. Copies of SDSs can be found in Appendix B.

## 6. Emergency Response Plan

This emergency response plan details actions to be taken in the event of Site emergencies. The PM and SHSO is responsible for the implementation of emergency response procedures onsite. The SHSO/PM provides specific direction for emergency action based upon information available regarding the incident and response capabilities and initiates emergency procedures and notification of appropriate authorities. In the event of an emergency, Site personnel are evacuated and do not participate in emergency response activities, response is facilitated through external emergency services.

### 6.1 Emergency Response

The SHSO, after investigating the incident and relevant information, shall determine the level of response required for containment, rescue and medical care. Limited on-site emergency response activities could occur therefore the SHSO is responsible for notifying external emergency response agencies. The SHSO provides relevant information to the responding organizations, including but not limited to the hazards associated with the emergency incident, potential containment problems, and missing Site personnel.

### 6.2 Emergency Alerting and Evacuation

If evacuation notice is given, Site workers leave the worksite, if possible, by way of the nearest exit. Appropriate primary and alternate evacuation routes and assembly areas have been identified and are shown on the Site Plan with Emergency Muster Area Figure 2. The routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by SHSO/PM.

Personnel exiting the Site gather at a designated assembly point. To determine that everyone has successfully exited the Site, personnel will be accounted for at the assembly Site. If any worker cannot be accounted for, notification is given to so that appropriate action can be initiated. Subcontractors on this Site have coordinated their emergency response plans to ensure that these plans are compatible and potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

### 6.3 Emergency Medical Treatment and First Aid

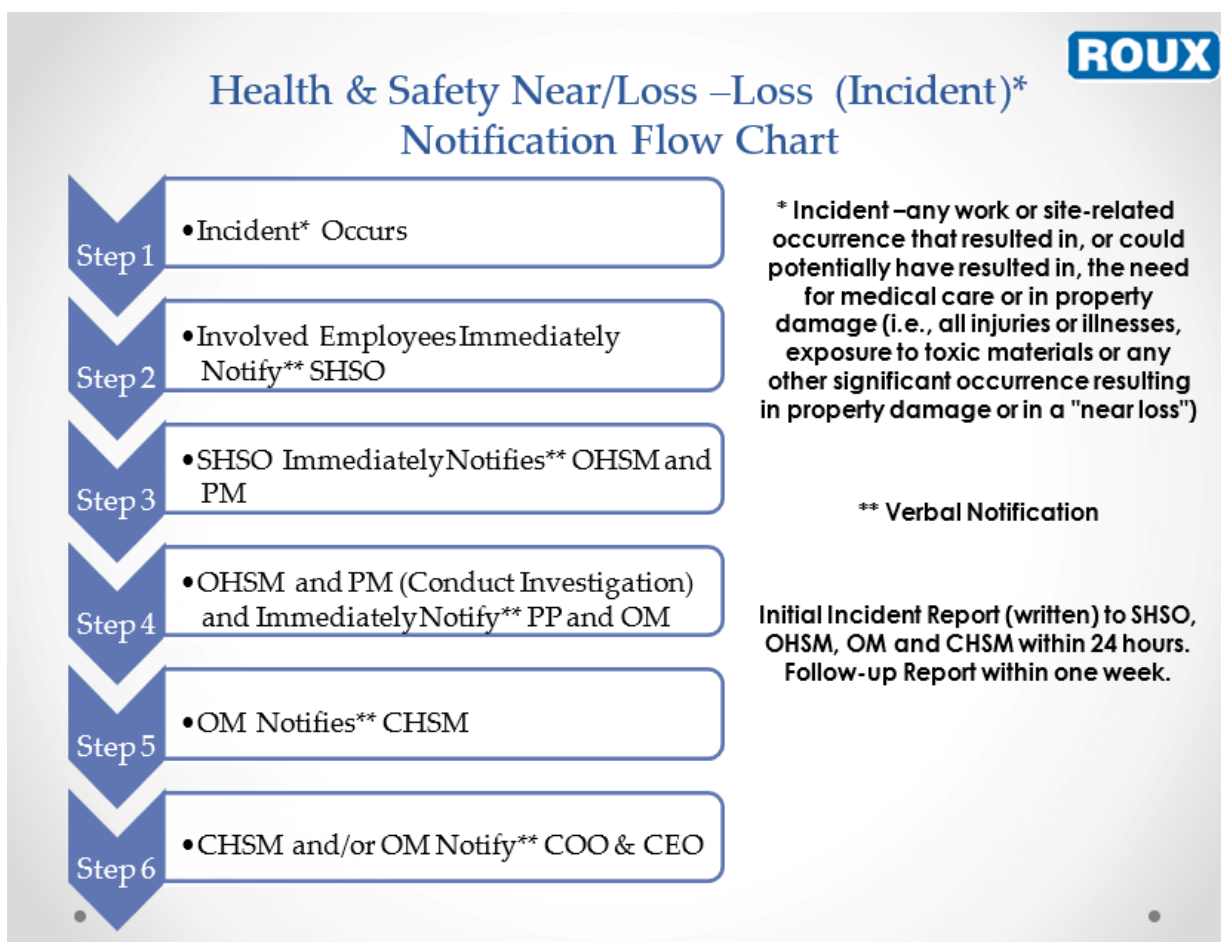
In the event of a work-related injury or illness, employees are required to follow the procedures outlined below. All work-place injury and illness situations require Roux's Project and Corporate Management Team to be notified when an injury/illness incident occurs, and communication with the contracted Occupational Health Care Management Provider, AllOne Health (AOH), is initiated. The Injury/Illness Notification Flowchart is provided below and within Roux's Incident Investigation and Reporting program included within Roux's Corporate Health and Safety Manual.

If on-site personnel require any medical treatment, the following steps will be taken:

- a. Notify Roux's Project and Corporate Management Team for any work-related injury and/or illness occurrence, and communicate with the contracted Occupational Health Care Management Provider, AOH, immediately following the notifications provided above.
- b. Based on discussions with the Project Team, Corporate Management and the AOH evaluation, if medical attention beyond onsite First Aid is warranted, transport the injured / ill person (IP) to the Urgent Care Center, or notify the Fire Department or Ambulance Emergency service and request an

ambulance or transport the victim to the hospital, and continue communications with Corporate Management Team. An Urgent Care/Hospital Route map with location to Urgent Care of New York/ Montefiore Medical Center is included as **Figure 3**.

- c. Decontaminate to the extent possible prior to administration of first aid or movement to medical or emergency facilities.
- d. First aid medical support will be provided by onsite personnel trained and certified in First Aid, Cardio Pulmonary Resuscitation (CPR), Automatic External Defibrillation (AED), and Blood-Borne Pathogens (BBP) Awareness, until relieved by emergency medical services (EMS).
- e. The SHSO and Project Manager will perform a Loss Investigation (LI) and the Project Team will complete the final Loss Report. If a Roux employee is involved in a vehicular incident, the employee must also complete the Acord Automobile Loss Notice.



## 6.4 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO or project principal will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related conditions.

- Limited visibility.
- Electrical storm potential.

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lightning. Observe daily weather reports and evacuate, if necessary, in case of inclement weather conditions.

## **6.5 Electrical Storm Guidelines**

In the event that lightning and/or thunder are observed while working onsite, all onsite activities shall stop and personnel shall seek proper shelter (e.g., substantial building, enclosed vehicle, etc.). Work shall not resume until the threat of lightning has subsided and no lightning or thunder has been observed for 30 minutes. If the possibility of lightning is forecast for the day, advise the onsite personnel on the risks and proper procedure at the pre-work safety briefing. Continuously monitor for changing weather conditions and allow enough time to properly stop work if lightning is forecast.



## 7. Safety Procedures

This section of the HASP presents the specific safety procedures to be implemented during Roux's activities at the Site in order to protect the health and safety of various on-site personnel. Minimum OSHA-mandated procedures are presented first, followed by client- and Site-specific procedures. Lastly, activity-specific procedures are discussed. These Site and activity-specific procedures supplement the general safety procedures included in Roux's Corporate Health and Safety Manual, which also must be followed in their entirety.

### 7.1 Training

At a minimum, Site personnel who will perform work in areas where there exists the potential for toxic exposure will be health and safety-trained prior to performing work onsite per OSHA 29 CFR 1910.120(e) and 29 CFR 1926.65(e). More specifically, all Roux, subcontractor, and other personnel engaged in sampling and remedial activities at the Site and who are exposed or potentially exposed to hazardous substances, health hazards, or safety hazards must have received at a minimum the 40 hour initial HAZWOPER training consistent with the requirements of 29CFR 1910.120(e)(3)(i) training and a minimum of 3 days' actual field experience under the direct supervision of a trained experienced supervisor, plus 8 hours of refresher training on an annual basis. Depending on tasks performed, less training may be permitted. Evidence of such training must be maintained at the Site at all times. Furthermore, all onsite management and supervisory personnel directly responsible for or who supervise the employees engaged in Site remedial operations, must have received an additional 8 hours of specialized training at the time of job assignment on topics including, but not limited to, the employer's safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques, plus 8 hours of refresher training on an annual basis.

Roux personnel training records are maintained in a corporate database with records available upon request from either the OHSM/SHSO/CHSM or Human Resources Department.

### 7.2 Site-Specific Safety Briefings for Visitors

A site-specific briefing is provided to all site visitors who enter this site beyond the site entry point. For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

### 7.3 HASP Information and Site-Specific Briefings for Workers

Site personnel review this HASP and are provided a site-specific tailgate briefing prior to the commencement of work to ensure that employees are familiar with this HASP and the information and requirements it contains as well as relevant JSAs. Additional briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing site characterization and analysis. Conditions for which we schedule additional briefings include, but are not limited to: changes in site conditions, changes in the work schedule/plan, newly discovered hazards, and incidents occurring during site work.

### 7.4 Medical Surveillance

The medical surveillance section of the Health and Safety Plan describes how worker health status is monitored at this site. Medical surveillance is used when there is the potential for worker exposure to

hazardous substance at levels above OSHA permissible exposure limits or other published limits. The purpose of a medical surveillance program is to medically monitor worker health to ensure that personnel are not adversely affected by site hazards. The provisions for medical surveillance at this site are based on the site characterization and job hazard analysis found in Section 4 of this HASP and are consistent with OSHA requirements in 29 CFR 1910.120(f) as applicable.

#### **7.4.1 Site Medical Surveillance Program**

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and job hazard analysis documented in Section 4 and JSAs within Appendix A of this HASP and in compliance with the requirements of 29 CFR 1910.120(f)(2). Based on site information and use of direct reading instruments, limited use of respirators (less than 30 days per year), and the absence of an employee-staffed HAZMAT team, a limited medical surveillance program is required and implemented at this site. The medical surveillance program provides that:

1. Workers assigned to tasks requiring the use of respirators receive medical examinations in accordance with 29 CFR 1910.134(e) to ensure they are physically capable to perform the work and use the equipment, and
2. If a worker is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substance or health hazards, medical examinations are provided to that worker as soon as possible after the occurrence and as required by the attending physician.
3. These medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to workers free of cost, without loss of pay, and at a reasonable time and place. In addition, the need to implement a more comprehensive medical surveillance program will be re-evaluated after any apparent over-exposure.

#### **7.4.2 Medical Recordkeeping Procedures**

Medical recordkeeping procedures are consistent with the requirements of 29 CFR 1910.1020 and are described in the company's overall safety and health program. A copy of that program is available at our Islandia, New York office.

The following items are maintained in worker medical records:

- Respirator fit test and selection
- Physician's medical opinion of fitness for duty (pre-placement, periodic, termination)
- Physician's medical opinion of fitness for respirator protection (pre-placement, periodic)
- Exposure monitoring results

#### **7.4.3 Program Review**

The medical program is reviewed to ensure its effectiveness. The Corporate Health and Safety Manager in coordination with the Human Resources Director is responsible for this review. At minimum, this review consists of:

- Review of accident and injury records and medical records to determine whether the causes of accidents and illness were promptly investigated and whether corrective measures were taken wherever possible,
- Evaluation of the appropriateness of required medical tests based on site exposures,
- Review of emergency treatment procedures and emergency contacts list to ensure they were site-specific, effective, and current.

## 7.5 Personnel Protection

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices and PPE are used to protect employees. Appropriate personal protective equipment (PPE) shall be worn by Site personnel when there is a potential exposure to chemical hazards or physical hazards (e.g., falling objects, flying particles, sharp edges, electricity and noise), as determined by the SHSO. The level of personal protection, type and kind of equipment selected will depend on the hazardous conditions and in some cases cost, availability, compatibility with other equipment, and performance. An accurate assessment of all these factors will be made before work can be safely executed.

Roux maintains a comprehensive written PPE program that addresses proper PPE selection, use, maintenance, storage, fit and inspection. Roux's PPE program can be found within Appendix C. PPE to be used at the Site will meet the appropriate American National Standards Institute (ANSI) standards and the following OSHA (General/Construction Industry) standards for minimum PPE requirements.

The minimum level of PPE for entry onto the Site is Level D. If evaluation of COCs or other physical hazards are present which require an upgrade in PPE please consult with the OHSM & CHSM on how to address. The following equipment shall be worn:

- Work uniform (long pants, sleeved shirt)
- Hard hat
- Steel or composite toe work boots
- Safety Glasses (must comply with one of the following ANSI/ISEA Z87.1-2010, ANSI Z87.1-2003, ANSI Z87.1-2003)
- Boot Covers (as needed)
- Hearing Protection (as needed)
- High visibility clothing (shirt/vest)
- Hand Protection (e.g., minimum cut resistance meeting ANSI 105-2000 Level 2)

Note that jewelry shall be removed or appropriately secured to prevent it from becoming caught in rotating equipment or unexpectedly snagged on a fixed object. (e.g., wrist watches, bracelets, rings, chains and necklaces, open earrings). Do not wear loose clothing and all shoulder length hair should be tied back.

Site specific PPE ensembles and materials are identified within task specific JSAs located within Appendix A, and any upgrades or downgrades of the level of protection (i.e., not specified in the JSA) must be approved by the PP and immediately communicated to all Roux personnel and subcontractors as applicable. PPE is used in accordance with manufacturer's recommendations.

### 7.5.1 Hearing Conservation

Hearing protection is made available when noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 dBA. Hearing protection is required when the 8-hour time weighted average sound level  $\geq$  90 dBA. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the JSA for the tasks/operation, and hearing protection is included as one of the control measures (PPE).

## 7.6 Monitoring

An air monitoring program is important to the safety of on- and off-Site personnel, and the surrounding area. Air monitoring will be performed during all intrusive activities (including but not limited to SSDS installation) in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP) included in Appendix F as well as procedures described below.

A preliminary survey, to establish background conditions in the immediate sampling area, may be made prior to the initiation of Site work including, but not limited to, monitoring wind direction (e.g. wind socks) and approximate temperature during all invasive Site activities. This survey will be conducted with the appropriate pre-calibrated air monitoring instrument(s), as warranted by the field activity. Once this survey has been complete, any changes in the type of PPE will be determined and relayed to those working on-Site.

Work zone air monitoring will be performed to verify that the proper level of PPE is used, and to determine if increased protection or work stoppage is required. The following equipment shall be used to monitor conditions:

- A Photoionization Detector (PID) with a lamp energy of 10.6 eV will be used to provide direct readings of organic vapor concentrations during intrusive activities to determine that personnel protection is adequate. Concentrations shall be recorded during intrusive activities with the potential to encounter contaminant vapors.
- A particulate meter (DustTrak II or similar) will be used to provide direct readings of dust concentrations during intrusive activities to determine that personnel protection is adequate. Concentrations shall be recorded during intrusive activities with the potential to encounter contaminated dust.
- Colorimetric detection tubes shall be used based on PID action levels, to qualitatively identify possible contaminants as applicable.
- A pre-calibrated multi-gas meter with combustible Lower Explosive Limit (LEL), oxygen (O<sub>2</sub>), carbon monoxide (CO), and hydrogen sulfide (H<sub>2</sub>S) sensors shall be used to monitor the potential for oxygen-deficient atmospheres, explosive concentrations of organic vapors, and toxic gases during intrusive operations. Monitoring will be performed according to the action levels for oxygen and combustible gases provided in this section. The calibration for this device will be performed using a known gas composition calibration mixture.

Personal exposure monitoring utilizing activated charcoal tubes may be considered based on whether or not the area sample results are at or above half of the PEL. The decision to perform the monitoring will be made by, and under the control of, the CHSM.

Below are monitoring action levels for Site-specific chemicals of concern. In the event that PID readings above the thresholds identified below are sustained for 5 minutes in the breathing zone, worker protection will require upgrading following notification to the OHSM and applicable parties (e.g., client, board of health, regulators, etc.).

### 7.6.1 Action Levels for Air Monitoring

PPE can remain at Level D if breathing zone VOC concentrations are less than 5 ppm and benzene is non-detect. Personnel are required to evacuate the Site when breathing zone VOC readings exceed 25 ppm.

The following tables include summaries of the air monitoring, work practices, and action levels for the expected contaminants. The action levels to initiate testing with colorimetric tubes for airborne volatiles is

1 ppm (PID reading) and is based on the Permissible Exposure Limit (PEL) for benzene (1 ppm). The colorimetric tubes are used to confirm the presence or absence of specific constituents, and they do not provide a measured concentration.

Air Monitoring Summary and Action Levels Organic Vapors	
PID Reading in Breathing Zone (ppm) <sup>1</sup>	Action
0-1 ppm above background <sup>2</sup>	Continue monitoring
1-5 ppm sustained 60 seconds	Continue monitoring, if applicable initiate additional collection of benzene using colorimetric tubes.
<5 ppm and no presence of benzene	Continue Monitoring, ventilate space
≥ 5 ppm - ≤ 25 ppm and no presence of benzene	Ventilate space until PID reads < 5 ppm. If < 25 ppm cannot be achieved, upgrade to Level C <sup>3</sup> .
≥ 25 ppm	Ventilate space and evacuate area.

<sup>1</sup> Based on relative response/sensitivity of PID to benzene.

<sup>2</sup> Background concentrations should be established at the beginning of each work day. It may be necessary to re-establish background concentrations and ambient conditions vary through the day.

<sup>3</sup> Measured air concentrations of known organic vapors will be reduced by the respirator to one half of the PEL or lower, and the individual and combined compound concentrations shall be within the service limit of the respirator cartridge.

Air Monitoring Summary and Action Levels Oxygen	
O <sub>2</sub> Reading in Breathing Zone (%) <sup>1</sup>	Action
20.9% O <sub>2</sub>	Oxygen level normal
< 19.5% O <sub>2</sub>	Oxygen deficient Interrupt task/Evacuate area
>23.5% O <sub>2</sub>	Oxygen enriched Interrupt task/Evacuate area

1. Action levels based on USEPA Standard Operating Safety Guides; Table 5-1, Atmospheric Hazard Action Guidelines may be further restricted based on the CHSM's professional judgment and experience.

Air Monitoring Summary and Action Levels Carbon Monoxide	
CO Reading in Breathing Zone (ppm) <sup>1</sup>	Action
<25 ppm	Inspect exhaust system for leaks or other sources of CO. Monitor initially and every 15 minutes during use of CO-generating equipment
25-50 ppm	Ventilate area. Monitor continuously and record measurements. Contact PM.
>50 ppm	Cease Field Operations. Ventilate area.

1. Based upon the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 25 ppm as an 8-hour time weighted average (TWA) and OSHA's Permissible Exposure Limit (PEL) of 50 ppm as an 8-hour TWA concentration.

Air Monitoring Summary and Action Levels Combustible Gases	
Lower Explosive Limit (LEL) Reading	Action
< 4% LEL (<2,000 ppm)	Site activities will continue with normal monitoring
4% – 20% LEL (2,000 – 10,000 ppm)	Stop work until levels dissipate to <4% LEL
> 20% LEL (>10,000 ppm)	Potential explosion hazard. Halt all site activities, research source of release, aerate work area, suppress source

Air Monitoring Summary and Action Levels Hydrogen Sulfide	
Hydrogen Sulfide (H <sub>2</sub> S) Reading	Action
<10 ppm	Site activities will continue with normal monitoring
>10 ppm	Stop work until levels dissipate to <10 ppm; use mechanical ventilation if possible
Cannot use air purifying respirators for H <sub>2</sub> S because of olfactory fatigue	

### **7.6.2 Air Monitoring Equipment and Calibration**

A PID calibrated to an appropriate calibration mixture will be used to detect organic vapors in and around the work areas. Monitoring will be conducted in and around all work areas and at the workers breathing zone before activities commence to establish a background level, then at 15-minute intervals throughout the day. All equipment will be calibrated according to the manufacturer's recommendation. A calibration log will be maintained and will include the name of the person who performed the calibration, the date and time calibrated, and the instrument reading at the time of calibration. A manual bellows pump or equivalent with colorimetric tubes for formaldehyde will be utilized to determine the course of action related to upgrading or downgrading the level of respiratory protection, as applicable.

If air monitoring data indicate safe levels of potentially harmful constituents at consistent intervals (5-minute intervals), then monitoring can be conducted less frequently (every 30 minutes). This determination will be made by the onsite SHSO. Monitoring data, including background readings and calibration records, will be documented. Work to be performed on-Site will conform to Roux Associates' Standard Operating Procedures (SOPs). Conformance with these guidelines as well as the guidelines described in this HASP and in the CAMP (Appendix F) will aid in mitigating the physical and chemical hazards mentioned throughout this HASP.

## **7.7 Tailgate Safety Meetings**

A designated Site worker will provide daily safety briefings (e.g., tailgate meetings) including, but not limited to, the following scenarios:

- When new operations are to be conducted;
- Whenever changes in work practices must be implemented; and
- When new conditions are identified and/or information becomes available.

Daily safety briefings shall be recorded on the Roux Daily Tailgate Health and Safety Meeting Log/Daily Site Safety Checklist, and all completed forms will become a part of the project file.

## **7.8 Spill Containment**

Spill containment equipment and procedures should, at a minimum, meet the requirements of the facility's Spill Prevention, Control and Countermeasure Plan, if applicable. Otherwise, spill containment equipment and procedures must be considered depending on the task including, but not limited to, chemical/product transfer points and handling.

### **7.8.1 Initial Spill Notification and Response**

Any worker who discovers a hazardous substance spill will immediately notify Jeff Wills/Project Manager. The worker will, to his/her best ability, report the hazardous substance involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, and any associated injuries without compromising their own safety.

### **7.8.2 Spill Evaluation and Response**

Jeff Wills/Project Manager is responsible for evaluating spills and determining the appropriate response. When this evaluation is being made, the spill area will be isolated and demarcated to the extent possible. If necessary to protect nearby community members, notification of the appropriate authorities is made by the

PM as appropriate. On-site response is limited to small spills (e.g., <10 gallons), large spills require external emergency responders who will be contacted by the SHSO.

## **7.9 Decontamination**

The decontamination section of the HASP describes how personnel and equipment are decontaminated when they leave the Exclusion Zone. This section also describes how residual waste from decontamination processes is disposed. The site decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants and protect against the transfer of contaminants to clean areas of the site and off-site. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and can permeate PPE surfaces. Decontamination is facilitated within the contamination reduction zone at this site.

### **7.9.1 Decontamination Procedures for Personnel and PPE**

The following are general decontamination procedures established and implemented at this site.

1. Decontamination is required for all workers exiting a contaminated area. Personnel may re-enter the Support Zone only after undergoing the decontamination procedures described below in the next section.
2. Protective clothing is decontaminated, cleaned, laundered, maintained and/or replaced as needed to ensure its effectiveness.
3. PPE used at this site that requires maintenance or parts replacement is decontaminated prior to repairs or
4. PPE used at this site is decontaminated or prepared for disposal on the premises. Personnel who handle contaminated equipment have been trained in the proper means to do so to avoid hazardous exposure.
5. This site uses an off-site laundry for decontamination of PPE. The site has informed that facility of the hazards associated with contaminated PPE from this site.
6. The site requires and trains workers that if their permeable clothing is splashed or becomes wetted with a hazardous substance, they will immediately exit the work zone, perform applicable decontamination procedures, shower, and change into uncontaminated clothing.
7. Procedures for disposal of decontamination waste meet applicable local, State, and Federal regulations.

### **7.9.2 Decontamination Procedures for Equipment**

All tools, equipment, and machinery from the Exclusion Zone or CRZ are decontaminated in the CRZ prior to removal to the Support Zone. Equipment decontamination procedures are designed to minimize the potential for hazardous skin or inhalation exposure and to avoid cross-contamination and chemical incompatibilities.

General Equipment Decontamination Procedures:

1. Decontamination is required for all equipment exiting a contaminated area. Equipment may re-enter the Support Zone only after undergoing the equipment decontamination procedures.
2. Vehicles that travel regularly between the contaminated and clean areas of the site are carefully decontaminated each time they exit the Exclusion Zone and the effectiveness of that decontamination is monitored to reduce the likelihood that contamination will be spread to other parts of the site.



3. Particular attention is given to decontaminating tires, scoops, and other parts of heavy equipment that are directly exposed to contaminants and contaminated soil.

The following items may be used to decontaminate equipment:

- Fresh water rinse;
- Non-phosphorus detergent wash;
- Distilled water rinse;
- Acetone rinse;
- Distilled water rinse; and
- A steam cleaner or pressure washer (heavy equipment only)

### 7.9.3 Monitoring the Effectiveness of Decontamination Procedures

Visual examination and sampling are used to evaluate the effectiveness of decontamination procedures. Visual examination is used to ensure that procedures are implemented as described and that they appear to control the spread of contaminants under changing site conditions. Visual examination is also used to inspect for signs of residual contamination or for contaminant permeation of PPE.

Personnel who work in contaminated areas of the site, either the Contamination Reduction Zone (CRZ) or the Exclusion Zone, are trained in the principles and practices of decontamination described in this section of the HASP and in related SOPs. If site procedures are changed as a result of inspection and monitoring, all affected employees are notified of these changes.

## 7.10 Confined Space Entry

Confined space entry is not anticipated to be performed at this Site.

The following is a list of the safety requirements for confined space entry at the Site:

- **ROUX PERSONNEL ARE NOT AUTHORIZED TO ENTER AN OSHA PERMIT REQUIRED CONFINED SPACE;**
- Currently the scope of work **DOES NOT** require personnel to enter permitted confined space for this project; and
- Any changes to the field activities that may necessitate confined space entry will be reported to the Project Principal and OHSM.

Confined space is defined as any space, depression, or enclosure that:

- Has limited opening for entry and egress;
- Is large enough for an employee to enter and perform assigned work; and
- Is not intended for continuous occupancy.

A permit required confined space is one that meets the definition of a confined space and has one or more of the following characteristics:

- May contain or produce life-threatening atmospheres due to oxygen deficiency the presence of toxic, flammable, or corrosive contaminants;
- Contains a material that has the potential for engulfment;

- Has an internal configuration that may cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section; and
- Contains any other serious safety or health hazards.

Although Roux personnel will not perform confined space entry, it is expected that subcontractors performing cleaning and mitigation and/or remedial measures activities may be required to enter structures that are considered to be a permit required confined space. Permitting of the confined space as well as hazard mitigation for entry will be completed by the subcontractor in accordance with 1910.146.

### **7.11 Client and Site-Specific**

In addition to the OSHA-specific procedures discussed above, there may be client and site-specific safety procedures that must be adhered to during the performance of remedial activities at the Site.

### **7.12 Unusual or Significant Risks**

Field activities that appear to have unusual or significant risks that cannot be adequately managed with existing risk tools such as LPS, HASPs, traffic safety plans, work permits, design and O&M practices, equipment HAZOPS or other safety tools must be referred to the CHSM to help with the assessment and management of the associated potential safety risks. Examples include the use of explosives for demolition, use of firearms to control wildlife, rappelling, demolition over water, etc.

### **7.13 Activity-Specific**

In addition to the general hazards discussed above, there are activity-specific hazards associated with each work activity planned for the Site. An activity-specific JSA has been completed for each of the activities planned for the Site. JSAs are provided in Appendix A. In the event that new work activities or tasks are planned, JSAs will be developed and implemented prior to performing the new activities. In the absence of a JSA, the personnel performing work must prepare a field JSA and receive clearance from a designated competent safety official prior to performing any task with significant risk. In emergency situations where time is critical SPSAs will be utilized to identify the task, associated hazards and mitigative actions to take. For lower risk activities (as deemed by the discretion of a Competent Person) where a JSA is determined to not be needed, the individual(s) conducting the activities must perform SPSAs prior to and during the work.

#### **7.13.1 Electrical and Other Utility Assessment and Accommodations**

Roux shall perform a site walk to identify any potential overhead electrical or utility lines. All applicable guidelines will be followed in the vicinity of overhead power and utility lines (see Section 8.12.1 below).

Roux has also reviewed all available Site maps showing buried utility lines to identify potential hazards, which revealed that no underground hazards are known to exist in the vicinity of the areas of the Site pertinent to this HASP.

#### **7.13.2 Subsurface Work**

Subsurface work activities will require adherence to Roux's Corporate Subsurface Utility Clearance Management program found within **Appendix D**.

### 7.13.3 Heavy Equipment

Use of heavy equipment at the Site will require adherence to Roux's Corporate Heavy Equipment Exclusion Zone Management Program found within **Appendix E**. Additionally, operation of the drill rig/other heavy equipment will maintain clearances from overhead power lines in accordance with OSHA 29 CFR1926.1408 Table A Minimum Clearance Distances provided below.

**Minimum Required Clearances for Energized Overhead Power Lines**

Nominal System Voltage of Power Line (K V)	Minimum Required Clearance (feet)
0-50	10
51-100	12
101-200	15
201-300	20
301-500	25
501-750	35
751-1000	45

1 kilovolt (KV) = 1,000 volts

## 8.13 Heat Stress

The National Oceanic and Atmospheric Administration records average minimum/maximum temperatures of 71/85 degrees Fahrenheit during the year in the Bronx, New York.

### 8.13.1 Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment in hot weather environments. Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps. The signs and symptoms of heat stress are as follows:

Severe muscle cramps, usually in the legs and abdomen;

Exhaustion, often to the point of collapse; and

Dizziness or periods of faintness.

First aid treatment includes, but is not limited to, shade, rest, and fluid replacement. Typically, the individual should recover within one-half hour while being monitored constantly. If the individual has not improved substantially within 30 minutes and the body temperature has not decreased, the individual should be transported to a hospital for medical attention.

### 8.13.2 Heat Exhaustion

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat while working or exercising. The circulatory system of the individual fails as blood collects near the skin to rid the body of excess heat through transference. The signs and symptoms of heat exhaustion are as follows:

- Rapid and shallow breathing;

- Weak pulse;
- Cold and clammy skin with heavy perspiration;
- Skin appears pale;
- Fatigue and weakness;
- Dizziness; and
- Elevated body temperature.

First aid treatment includes, but is not limited to, cooling the victim, elevating the feet, and replacing fluids.

If the individual is not substantially improved within 30 minutes and the body temperature has not decreased, the individual should be transported to the hospital for medical attention. Maps showing AllOne Health Occupational Care Management contact information, depicting the locations of and routing to Coast Plaza hospital and Concentra Urgent Care in La Palma are illustrated on pages 2 and 3.

### **8.13.3 Heat Stroke**

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a MEDICAL EMERGENCY requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- Dry, hot red skin;
- Body temperature approaching or above 105 degrees F;
- Confusion, altered mental state, slurred speech;
- Seizures;
- Large (dilated) pupils; and
- Loss of consciousness – the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility. Heat stress is a significant hazard if any type of protective equipment (semi-permeable or impermeable) that prevents evaporative cooling is worn in hot weather environments.

### **8.14 Cold Stress**

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole-body protection. Adequate insulating clothing must be used when the air temperature is below 60°F. A work/rest regimen will be initiated when ambient temperatures and protective clothing cause a stressful situation. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. The signs and symptoms of cold stress include the following:

- Severe shivering;
- Abnormal behavior;
- Slowing;
- Weakness;
- Stumbling or repeated falling;
- Inability to walk;

- Collapse; and/or
- Unconsciousness.

First aid requires removing the victim from the cold environment and seeking medical attention immediately. Also, prevent further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks and encourage activity such as walking, wrapped in a blanket.

## 8. Field Team Review

Each person performing work at or visiting this site shall sign this section after site-specific training is completed and before being permitted to access the CRZ or Exclusion Zone.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with the provision contained therein.

**Site/Project: Laconia Ave**

[illegible]

# 9. Approvals

By their signature, the undersigned certify that this HASP is approved and will be utilized at the Laconia Ave Site.

\_\_\_\_\_  
Levi Curnutte – Site Health and Safety Officer

\_\_\_\_\_  
Date

\_\_\_\_\_  
Levi Curnutte - Office Health and Safety Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Jeff Wills – Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
Joseph Duminuco – Project Principal

\_\_\_\_\_  
Date

**Site-Specific Health and Safety Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**TABLE**

Toxicological Properties of Hazardous Substances Present at the Site



**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

**References**

U.S. Department of Labor. 1990. OSHA Regulated Hazardous Substances, industrial Exposure and Control Technologies Government Institutes, Inc.  
Hawley's Condensed Chemical Dictionary, Sax, N. Van Nostrand and Reinhold Company, 11th Edition, 1987.  
Proctor, N.H., J.P. Hughes and M.L. Fischman, 1989. Chemical Hazards of the Workplace. Van Nostrand Reinhold. New York.  
Sax, N.I. and R.J. Lewis. 1989. Dangerous Properties of Industrial Materials. 7th Edition. Van Nostrand Reinhold. New York.  
Guide to Occupational Exposure Values. 2008. American Conference of Governmental Industrial Hygienists (ACGIH).  
NIOSH Pocket Guide to Chemical Hazards. 2005. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health

**Abbreviations:**

ACGIH – American Conference of Governmental Industrial Hygienists.  
BP – boiling point at 1 atmosphere, °F  
C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.  
Ca - considered by NIOSH to be a potential occupational carcinogen  
CAS# Chemical Abstracts Service registry number which is unique for each chemical.  
Fl. Pt. – Flash point  
IDLH - Immediately Dangerous to Life and Health concentrations represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health  
LEL – Lower explosive (flammable) limit in air, % by volume (at room temperature)  
mg/m<sup>3</sup> – Milligrams of substance per cubic meter of air  
NIOSH -National Institute for Occupational Safety and Health.  
OSHA – Occupational Safety and Health Administration  
PEL - OSHA Permissible Exposure Limit (usually) a time weighted average concentration that must not be exceeded during any 8 hour work shift of a 40 hr work week.  
ppm – parts per million  
REL – NIOSH Recommended Limit indicated a time weighted average concentration that must not be exceeded during any 10 hour work shift of a 40 hr work week  
STEL – Short-term exposure limit  
TLV -ACGIH Threshold Limit Values (usually 8 hour time weighted average concentrations).  
TWA – 8-hour, time-weighted average  
UEL – Upper explosive (flammable) limit in air, % by volume (at room temperature)

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,1,1-Trichloroethane	71-55-6	TWA 350 ppm STEL 440 ppm C 440 ppm	C 350 ppm (1900 mg/m <sup>3</sup> ) [15-minute]	TWA 350 ppm (1900 mg/m <sup>3</sup> )	700 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac	Eyes, skin, central nervous system, cardiovascular system, liver	Colorless liquid with a mild, chloroform-like odor. BP: 165°F UEL: 12.5% LEL: 7.5%
1,1,2-Trichloroethane	79-00-5	TWA 10 ppm	Ca TWA 10 ppm (45 mg/m <sup>3</sup> ) [skin]	TWA 10 ppm (45 mg/m <sup>3</sup> ) [skin]	Ca [100 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]	Eyes, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, chloroform-like odor. BP: 237°F UEL: 15.5% LEL: 6%
1,1-Dichloroethane	75-34-3	TWA 100 ppm	TWA 100 ppm (400 mg/m <sup>3</sup> )	TWA 100 ppm (400 mg/m <sup>3</sup> )	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation skin; central nervous system depression; liver, kidney, lung damage	Skin, liver, kidneys, lungs, central nervous system	Colorless, oily liquid with a chloroform-like odor. BP: 135°F Fl.P: 2°F UEL: 11.4% LEL: 5.4%
1,1-Dichloroethene	75-35-4	TWA 5 ppm	Ca (lowest feasible concentrat TWA 1ppm		Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor. BP: 89°F Fl.P: -2°F UEL: 15.5% LEL: 6.5% Class IA Flammable Liquid
1,2,4-Trimethylbenzene	95-63-6	None established	TWA 25 ppm (125mg/m <sup>3</sup> )	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit,	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 337°F FL.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable liquid
1,2,4-Trimethylbenzene	95-63-6	TWA 25 ppm (125 n TWA 25 ppm (125 mg/m <sup>3</sup> )		None established	N.D.	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 337°F Fl.P: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable Liquid
1,2-Dichlorobenzene	95-50-1	TWA 25 ppm STEL 50 ppm	C 50 ppm (300 mg/m <sup>3</sup> )	C 50 ppm (300 mg/m <sup>3</sup> )	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide] BP: 357°F Fl.P: 151°F UEL: 9.2% LEL: 2.2% Class IIIA Combustible Liquid
1,2-Dichloroethane	107-06-2	TWA 10 ppm	Ca TWA 1 ppm (4 mg/m <sup>3</sup> ) STEL 2 ppm (8 mg/m <sup>3</sup> )	TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	Ca [50 ppm]	inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] BP: 182°F Fl.P: 56°F UEL: 16% LEL: 6.2% Class IB Flammable Liquid

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm (790	TWA 200 ppm (790 mg/m <sup>3</sup> )	TWA 200 ppm (790 mg/m <sup>3</sup> )	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor BP: 118-140°F Fl.P: 36-39°F UEL: 12.8% LEL: 5.6% Class IB Flammable Liquid
1,3,5-Trimethylbenzene	108-67-8	None established	TWA 25 ppm (125mg/m <sup>3</sup> )	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 329°F FL.P: 122°F Class II Flammable liquid
1,3,5-Trimethylbenzene	108-67-8	TWA 25 ppm (125 n	TWA 25 ppm (125 mg/m <sup>3</sup> )	None established	N.D	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 329°F Fl.P: 122°F Class II Flammable Liquid
1,4-Dichlorobenzene	106-46-7	TWA 10 ppm	Ca	TWA 75 ppm (450 mg/m <sup>3</sup> )	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin	Colorless or white crystalline solid with a mothball-like odor. [insecticide] BP: 345°F Fl.P: 150°F LEL: 2.5% Combustible Solid
2,4-Dimethylphenol	105-67-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system, mouth, throat, stomach; dizziness, weakness, fatigue, nausea, headache; systemic damage; moderate to severe eye injury.	Skin, CVS, eyes, CNS	Clear, colorless liquid with a faint ether or chloroform-like odor BP: 178°F
2-Butanone (MEK)	78-93-3	TWA 200 ppm (590 mg/m <sup>3</sup> ) STEL 300 ppm (885 mg/m <sup>3</sup> )	TWA 200 ppm (590 mg/m <sup>3</sup> ) STEL 300 ppm (885 mg/m <sup>3</sup> )	TWA 200 ppm (590 mg/m <sup>3</sup> )	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a moderately sharp, fragrant, mint or acetone-like odor. BP: 175°F Fl.P: 16°F UEL(200°F): 11.4% LEL(200°F): 1.4% Class IB Flammable Liquid
Acenaphthene	83-32-9	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Brown solid

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Acetone	67-64-1	TWA 500 ppm STEL 50 ppm	TWA 250 ppm (590 mg/m <sup>3</sup> )	TWA 1000 ppm (2400 mg/m <sup>3</sup> )	2500 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor BP: 133°F Fl.P: 0°F UEL: 12.8% LEL: 2.5% Class IB Flammable Liquid
Anthracene	65996-93-2	TWA 0.2 mg/m <sup>3</sup>	Ca TWA 0.1 mg/m <sup>3</sup> (cyclohexane-extractable fraction)	TWA 0.2 mg/m <sup>3</sup> (benzene-soluble fraction)	Ca [80 mg/m <sup>3</sup> ]	inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
Antimony	7440-36-0	TWA 0.5 mg/m <sup>3</sup>	TWA 0.5 mg/m <sup>3</sup>	TWA 0.5 mg/m <sup>3</sup>	50 mg/m <sup>3</sup> (as S)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	Eyes, skin, respiratory system, cardiovascular system	Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder. BP: 2975°F
Arsenic (inorganic)	7440-38-2 (metal)	TWA 0.01 mg/m <sup>3</sup>	Ca C 0.002 mg/m <sup>3</sup> [15-min]	TWA 0.010 mg/m <sup>3</sup>	Ca [5 mg/m <sup>3</sup> (as As)]	Inhalation; ingestion; skin absorption; skin and/or eye contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Liver, kidneys, skin, lungs, lymphatic sys	Metal: silver-gray or tin-white, brittle, odorless solid BP: sublimates
Asbestos	1332-21-4	TWA 0.1 f/cc	Ca 100,000 fibers/m <sup>3</sup>	TWA 0.1 fiber/cm <sup>3</sup>	Ca [IDLH value has not been determined]	Inhalation; ingestion; skin and/or eye contact	Asbestosis (chronic exposure), dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritation eyes, [potential occupational carcinogen]	Respiratory system, eyes,	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite), fibrous, odorless solids. BP: decomposes
Asphalt fumes	8052-42-4	TWA 0.5 mg/m <sup>3</sup> (fumes)	Ca C 5 mg/m <sup>3</sup> [15 min]	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; skin and/or eye contact	Irritation eyes, resp sys	Eyes, respiratory system	Black or dark brown cement-like substance Combustible solid
Barium	7440-39-3	TWA 0.5 mg/m <sup>3</sup>	None established	TWA 0.5 mg/m <sup>3</sup>	None established	Inhalation, ingestion, skin contact	Irritation skin, respiratory system	Skin, eyes, respiratory system	Yellow white powder BP: 1640 C
Benzene	71-43-2	TWA 0.5 ppm STEL 2.5 ppm	Ca TWA 0.1 ppm STEL 1 ppm	TWA 1 ppm STEL 5 ppm	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Colorless to light yellow liquid with an aromatic odor [Note: Solid below 42 °F] BP: 176°F Fl.Pt = 12°F LEL: 1.2% UEL: 7.8% Class B Flammable liquid
Benzo[a]anthracene	56-55-3	None established	None established	None established	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	Irritation eyes, skin, respiratory system, CNS	Skin	Pale Yellow crystal, solid BP: 438 C

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Benzo[a]pyrene	50-32-8	None established	TWA 0.1 mg/m <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	POISON. This material is an experimental carcinogen, mutagen, tumorigen, neoplastigen and teratogen. It is a probable carcinogen in humans and a known human mutagen. IARC Group 2A carcinogen. It is believed to cause bladder, skin and lung cancer. Exposure to it may damage the developing fetus. May cause reproductive damage. Skin, respiratory and eye irritant or burns.	Skin, eye, bladder, lung, reproductive	Yellow crystals or powder [found in cigarette smoke, coal tar, fuel exhaust gas and in many other sources] BP: 495 C
Benzo[b]fluoranthene	205-99-2	None established	TWA 0.1 mg/m <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	None established	Inhalation; ingestion; skin and/or eye contact	No data were identified on the toxicity of benzo[b]fluoranthene to humans. Based on results of studies in animals, IARC concluded that benzo[b]fluoranthene is possibly carcinogenic to humans	Respiratory system, skin, bladder, kidneys	Off-white to tan powder
Benzo[k]fluoranthene	207-08-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory tract, gastrointestinal; fatal if swallowed, inhaled, absorbed through the skin; vomiting, nausea, diarrhea	Lungs, respiratory system	Yellow crystals BP: 480 C
Beryllium	7440-41-7 (metal)	TWA 0.002 mg/m <sup>3</sup>	Ca C 0.0005 mg/m <sup>3</sup>	TWA 0.002 mg/m <sup>3</sup> C 0.005 mg/m <sup>3</sup> (30 minutes) with a maximum peak of 0.025 mg/m <sup>3</sup>	Ca [4 mg/m <sup>3</sup> (as Be)]	inhalation, skin and/or eye contact	Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]	Eyes, skin, respiratory system	Metal: A hard, brittle, gray-white solid. BP: 4532°F
Bis(2-ethylhexyl) phthalate	117-81-7	TWA 5 mg/m <sup>3</sup>	TWA 5 mg/m <sup>3</sup> STEL 10 mg/m <sup>3</sup> (do not exceed during any 15-minute work period)	TWA 5 mg/m <sup>3</sup>	None established	inhalation, skin and/or eye contact	Irritation eyes, skin, nose, throat; affect the nervous system and liver; damage to male reproductive glands	Eyes, skin, nose, respiratory system, nervous system, reproductive system, liver	Colorless to light colored, thick liquid with slight odor
Butane	106-97-8	TWA 1000 ppm	TWA 800 ppm (1900 mg/m <sup>3</sup> )	None established	None established	inhalation, skin and/or eye contact (liquid)	Drowsiness, narcosis, asphyxia; liquid: frostbite	central nervous system	Colorless gas with a gasoline-like or natural gas odor. BP: 31°F UEL: 8.4% LEL: 1.6% Flammable Gas
Cadmium	7440-43-9 (metal)	TWA 0.01 mg/m <sup>3</sup>	Ca	TWA 0.005 mg/m <sup>3</sup>	Ca [9 mg/m <sup>3</sup> (as Cd)]	inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	respiratory system, kidneys, prostate, blood	Metal: Silver-white, blue-tinged lustrous, odorless solid. BP: 1409°F

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Carbon Disulfide	75-15-0	TWA 1 ppm	TWA 1 ppm (3 mg/m <sup>3</sup> ) STEL 10 ppm (30 mg/m <sup>3</sup> ) [skin]	TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	Colorless to faint-yellow liquid with a sweet ether-like odor. BP: 116°F F.P: -22°F U.E.L: 50.0% L.E.L: 1.3% Class IB Flammable Liquid
Chlorobenzene	108-90-7	TWA 10 ppm	None established	TWA 75 ppm (350 mg/m <sup>3</sup> )	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eyes, skin, respiratory system, central nervous system, liver	Colorless liquid with an almond-like odor BP: 270°F F.P: 82°F U.E.L: 9.6% L.E.L: 1.3%
Chloroethane	75-00-3	TWA 100ppm	Handle with caution in the workplace	TWA 1000 ppm (2600 mg/m <sup>3</sup> )	3800 ppm [10%LEL]	inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Liver, kidneys, respiratory system, cardiovascular system, central nervous system	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. BP: 54°F F.P: NA (Gas) -58°F (Liquid) U.E.L: 15.4% L.E.L: 3.8%
Chloroform	67-66-3	TWA 10 ppm	Ca STEL 2 ppm (9.78 mg/m <sup>3</sup> ) [60-minute]	C 50 ppm (240 mg/m <sup>3</sup> )	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Liver, kidneys, heart, eyes, skin, central nervous system	Colorless liquid with a pleasant odor BP: 143°F
Chromium	7440-47-3	TWA 0.5 mg/m <sup>3</sup> (metal and Cr III compounds) TWA 0.05 mg/m <sup>3</sup> (water-soluble Cr IV compounds) TWA 0.01 mg/m <sup>3</sup> (insoluble Cr IV compounds)	TWA 0.5 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup>	250 mg/m <sup>3</sup> (as Cr)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid. BP: 4788°F
Chrysene; Phenanthrene; Pyrene; Coal tar pitch volatiles	65996-93-2	TWA 0.2 mg/m <sup>3</sup>	Ca TWA 0.1 mg/m <sup>3</sup> (cyclohexane-extractable fraction)	TWA 0.2 mg/m <sup>3</sup> (benzene-soluble fraction)	Ca [80 mg/m <sup>3</sup> ]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
cis-1,2-Dichloroethene	158-59-2	TWA 200 ppm	TWA 200 ppm	TWA 200 ppm	None established	inhalation, skin absorption, ingestion	Harmful if swallowed, inhaled, or absorbed through skin. Irritant. Narcotic. Suspected carcinogen	Skin	Colorless liquid BP: 60 C F.P: 4 C U.E.L: 12.8% L.E.L: 9.7 %
Copper	7440-50-8	TWA 0.2mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	TWA 1 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup>	100 mg/m <sup>3</sup> (as Cu)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing	Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)	Noncombustible Solid in bulk form, but powdered form may ignite. BP: 4703°F
Dibenzo[a,h]anthracene	53-70-3	None established	None established	None established	None established	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin	Eyes, skin; skin photosensitization.	Colorless crystalline powder BP: 524°C

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Ethylbenzene	100-41-4	TWA 100 ppm STEL 125 ppm	TWA 100 ppm (435 mg/m <sup>3</sup> ) STEL 125 ppm (545 mg/m <sup>3</sup> )	TWA 100 ppm (435 mg/m <sup>3</sup> )	800 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with an aromatic odor. BP: 277°F Fl.P: 55°F UEL: 6.7% LEL: 0.8% Class IB Flammable Liquid
Fluoranthene	206-44-0	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible burns; heart and liver injury, pulmonary edema, respiratory arrest, gastrointestinal disturbances.	Heart, liver, lungs.	Yellow needles.
Fluorene	86-73-7	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation skin, digestive tract	Skin	White crystals BP: 563°F
Fuel Oil #2	68476-30-2	TWA 100mg/m <sup>3</sup> (aerosol and vapor, as total hydrocarbons)	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS effects; nausea, vomiting, headache, cramping, dizziness, weakness, loss of coordination,, drowsiness; kidney, liver damage	Eyes, skin, CNS	Clear or yellow to red oily liquid, kerosene-like odor BP: 347 - 689 °F UEL:5-6% LEL: 0.7-1.0%
Gasoline	8006-61-9	TWA 300 ppm STEL 500 ppm	Carcinogen	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; ingestion; skin and/or eye contact	Eyes and skin irritation, mucous membrane; dermatitis; headache; listlessness, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis; possible liver, kidney damage [Potential occupational carcinogen]	Eyes, skin, respiratory system, CNS, Liver, Kidneys	Clear liquid with a characteristic odor, aromatic Fl.Pt = -45°F LEL = 1.4% UEL = 7.6% Classs 1B Flammable Liquid
Hexachlorobutadiene	87-68-3	TWA 0.02 ppm	Ca TWA 0.02 ppm (0.24 mg/m <sup>3</sup> ) [skin]	None established	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, kidneys	Clear, colorless liquid with a mild, turpentine-like odor. BP: 419°F
Hydrogen Sulfide	7783-06-4	TWA (1 ppm) STEL (5 ppm) (adopted values for which changes are proposed in the NIC)	C 10 ppm (15 mg/m <sup>3</sup> ) [10-minute]	C 20 ppm 50 ppm [10-minute maximum peak]	100 ppm	inhalation, skin and/or eye contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, central nervous system	Colorless gas with a strong odor of rotten eggs. BP: -77°F UEL: 44.0% LEL: 4.0% Flammable Gas
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impairment of blood forming tissue	Skin	Fluorescent green-yellow crystalline solid BP: 536 C

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impairment of blood forming tissue	Skin	Yellowish crystal solid BP: 536 C
Isopropylbenzene	98-82-8	TWA 50 ppm	TWA 50 ppm (245 mg/m <sup>3</sup> ) [skin]	TWA 50 ppm (245 mg/m <sup>3</sup> ) [skin]	900 ppm [10%LEL]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor. BP: 306°F F.P: 96°F UEL: 6.5% LEL: 0.9%
Lead	7439-92-1	TWA 0.05 mg/m <sup>3</sup>	TWA (8-hour) 0.050 mg/m <sup>3</sup>	TWA 0.050 mg/m <sup>3</sup>	100 mg/m <sup>3</sup> (as Pb)	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. BP: 3164°F Noncombustible Solid in bulk form
Manganese	7439-96-5 (metal)	TWA 0.2 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup> STEL 3 mg/m <sup>3</sup>	C 5 mg/m <sup>3</sup>	500 mg/m <sup>3</sup> (as Mn)	inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. BP: 3564°F
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	TWA 0.01 mg/m <sup>3</sup> STEL 0.03 mg/m <sup>3</sup> [skin]	TWA 0.01 mg/m <sup>3</sup> STEL 0.03 mg/m <sup>3</sup> [skin]	TWA 0.01 mg/m <sup>3</sup> C 0.04 mg/m <sup>3</sup>	2 mg/m <sup>3</sup> (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects	Eyes, skin, central nervous system, peripheral nervous system, kidneys	Appearance and odor vary depending upon the specific (organo) alkyl mercury compound
Mercury compounds [except (organo) alkyls] (as Hg) Mercury	7439-97-6	TWA 0.025 mg/m <sup>3</sup> (elemental and inorganic forms)	Hg Vapor: TWA 0.05 mg/m <sup>3</sup> [skin] Other: C 0.1 mg/m <sup>3</sup> [skin]	TWA 0.1 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eyes, skin, respiratory system, central nervous system, kidneys	Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.] BP: 674°F
Methyl tert-butyl ether (MTBE)	1634-04-4	TWA 50 ppm	No established REL	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, mucous membrane, respiratory; dizziness, nausea, headache, intoxication	Eyes, skin, mucous membrane, respiratory system, central nervous system	Colorless liquid BP: 55.2 C



**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Methylene Chloride	75-09-2	TWA 50 ppm, A3 - suspected human carcinogen	Ca	TWA 25 ppm STEL 125 ppm	Ca [2300 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	Eyes, skin, cardiovascular system, central nervous system	Colorless liquid with a chloroform-like odor BP: 104°F UEL: 23% LEL: 13%
Naphthalene	91-20-3	TWA 10 ppm STEL 15 ppm	TWA 10 ppm (50 mg/m <sup>3</sup> ) STEL 15 ppm (75 mg/m <sup>3</sup> )	TWA 10 ppm (50 mg/m <sup>3</sup> )	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, central nervous system	Colorless to brown solid with an odor of mothballs. BP: 424°F Fl.P: 174°F UEL: 5.9% LEL: 0.9%
n-Butylbenzene	104-51-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS depression, lung damage; nausea, vomiting, headache, dizziness, weakness, loss of coordination, blurred vision, drowsiness, confusion, disorientation	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sweet odor BP: 183 C Fl.P: 59 C UEL: 5.8% LEL: 0.8%
Nickel	7440-02-0 (Metal)	TWA 1.5 mg/m <sup>3</sup> (elemental) TWA 0.1 mg/m <sup>3</sup> (soluble inorganic compounds) TWA 0.2 mg/m <sup>3</sup> (insoluble inorganic compounds) TWA 0.1 mg/m <sup>3</sup> (Nickel subsulfide)	Ca TWA 0.015 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup>	Ca [10 mg/m <sup>3</sup> (as Ni)]	inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Nasal cavities, lungs, skin	Metal: Lustrous, silvery, odorless solid. BP: 5139°F
Nitrobenzene	98-95-3	TWA 1 ppm	TWA 1 ppm (5 mg/m <sup>3</sup> ) [skin]	TWA 1 ppm (5 mg/m <sup>3</sup> ) [skin]	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects	Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system	Yellow, oily liquid with a pungent odor like paste shoe polish. BP: 411°F Fl.P: 190°F LEL(200°F): 1.8%
n-Propylbenzene	103-65-1	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Harmful if swallowed, Irritation eyes, skin, digestive tract, respiratory tract, central nervous system	Eyes, skin, central nervous system, respiratory system	colorless or light yellow liquid BP: 159 C Fl.P: 47 C UEL: 6% LEL: 0.8%
Petroleum hydrocarbons(Petroleum distillates)	8002-05-9	None established	TWA 350 mg/m <sup>3</sup> C 1800 mg/m <sup>3</sup> [15 min]	TWA 500 ppm (2000 mg/m <sup>3</sup> )	1,100 [10% LEL]	Inhalation; ingestion; skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, drowsiness, headache, nausea; dried/cracked skin; chemical pneumonitis	CNS, eyes, respiratory system, skin	Colorless liquid with a gasoline or kerosene-like odor BP: 86-460°F Fl. Pt = -40 to -86°F UEL: 5.9% LEL: 1.1% Flammable liquid

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Phenol	108-95-2	TWA 5 ppm	TWA 5 ppm (19 mg/m <sup>3</sup> ) C 15.6 ppm (60 mg/m <sup>3</sup> ) [15-minute] [skin]	TWA 5 ppm (19 mg/m <sup>3</sup> ) [skin]	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching	Eyes, skin, respiratory system, liver, kidneys	Colorless to light-pink, crystalline solid with a sweet, acrid odor. BP: 359°F UEL: 8.6% LEL: 1.8%
p-Isopropyltoluene	99-87-6	None established	None established	None established	None established	inhalation, skin absorption, eye contact	Irritation skin	CNS, skin	Colorless, clear liquid, sweetish aromatic odor BP: 350.8°F Class III Flammable liquid
sec-Butylbenzene	135-98-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, upper airway; central nervous system, headache, dizziness; gastrointestinal disturbance	Respiratory system, central nervous system, eyes, skin;	Colorless liquid BP: 344°F F.I.P: 126 °F UEL: 6.9% LEL: 0.8% Combustible liquid
Selenium	7782-49-2	TWA 0.2 mg/m <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	1 mg/m <sup>3</sup> (as Se)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eyes, skin, respiratory system, liver, kidneys, blood, spleen	Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.] BP: 1265°F
Silver	7440-22-4 (metal)	TWA 0.1 mg/m <sup>3</sup> (metal, dust, fumes) TWA 0.01 mg/m <sup>3</sup> (Soluble compounds, as Ag)	TWA 0.01 mg/m <sup>3</sup>	TWA 0.01 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> (as Ag)	inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Nasal septum, skin, eyes	Metal: White, lustrous solid BP: 3632°F
tert-Butylbenzene	98-06-6	None established	None established	None established	None established	inhalation, skin absorption, ingestion,	Eye and respiratory irritant; CNS depression; liver or kidney damage	Respiratory system, central nervous system, eyes, liver, kidney	Colorless liquid with an aromatic odor BP: 168 - 169 C F.I.P: 34 C UEL:5.6 % LEL: 0.8 %
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm (STEL) listed as A3, animal carcinogen	Ca Minimize workplace exposure concentrations	TWA 100 ppm C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor. BP: 250°F Noncombustible Liquid

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 4125-4149 Laconia Avenue, Bronx, New York**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Toluene	108-88-3	TWA 20 ppm	TWA 100 ppm (375 mg/m <sup>3</sup> ) STEL 150 ppm (560 mg/m <sup>3</sup> )	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, pungent, benzene-like odor. BP: 232°F Fl.P: 40°F UEL: 7.1% LEL: 1.1% Class IB Flammable Liquid
trans-1,2-Dichloroethene	156-60-5	TWA 200 ppm	None established	TWA 200 ppm STEL 250 ppm (skin)	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Narcotic. Irritation eyes, skin, respiratory tract, mucous membrane; CNS depression.	Respiratory tract, mucous membrane, eyes, skin, CNS	Colorless liquid with a fruity pleasant odor BP: 48°C Fl.P 6C UEL: 12.8% LEL: 9.7%
Trichloroethene	79-01-6	TWA 10 ppm STEL 25 ppm	Ca	TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)	Ca [1000 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid (unless dyed blue) with a chloroform-like odor. BP: 189°F UEL(77°F): 10.5% LEL(77°F): 8%
Vinyl Chloride	75-01-4	TWA 1 ppm	Carcinogen	TWA 1 ppm C 5 ppm [15-minute]	Ca [IDLH value has not been determined]	inhalation, skin, and/or eye contact (liquid)	Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Liver, central nervous system, blood, respiratory system, lymphatic system	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. BP: 7°F UEL: 33.0% LEL: 3.6% Flammable Gas
Xylene (m, o & p isomers)	108-38-3, 95-47-6, 106-42-3	TWA 100 ppm (435 mg/m <sup>3</sup> ) STEL 150 ppm	TWA 100 ppm (435 mg/m <sup>3</sup> )	TWA 100 ppm (435 mg/m <sup>3</sup> )	900 ppm	Skin absorption, inhalation, ingestion, skin, and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Colorless liquid with an aromatic odor BP: 282°F, 292°F, 281°F Fl. Pt. 82°F, 90°F, 81°F LEL: 1.1%, 0.9%, 1.1% UEL: 7.0%, 6.7%, 7.0% Class C Flammable Liquid
Zinc	7440-66-6	TWA 10 mg/m <sup>3</sup> (Inhalable fraction)	None established	TWA 10 mg/m <sup>3</sup> (for zinc oxide fume)	None established	skin and/or eye contact, inhalation, ingestion	Irritation eyes, skin, respiratory tract; gastrointestinal disturbances	Eyes, skin, respiratory system	Bluish gray solid BP: 1664.6°F Flammable

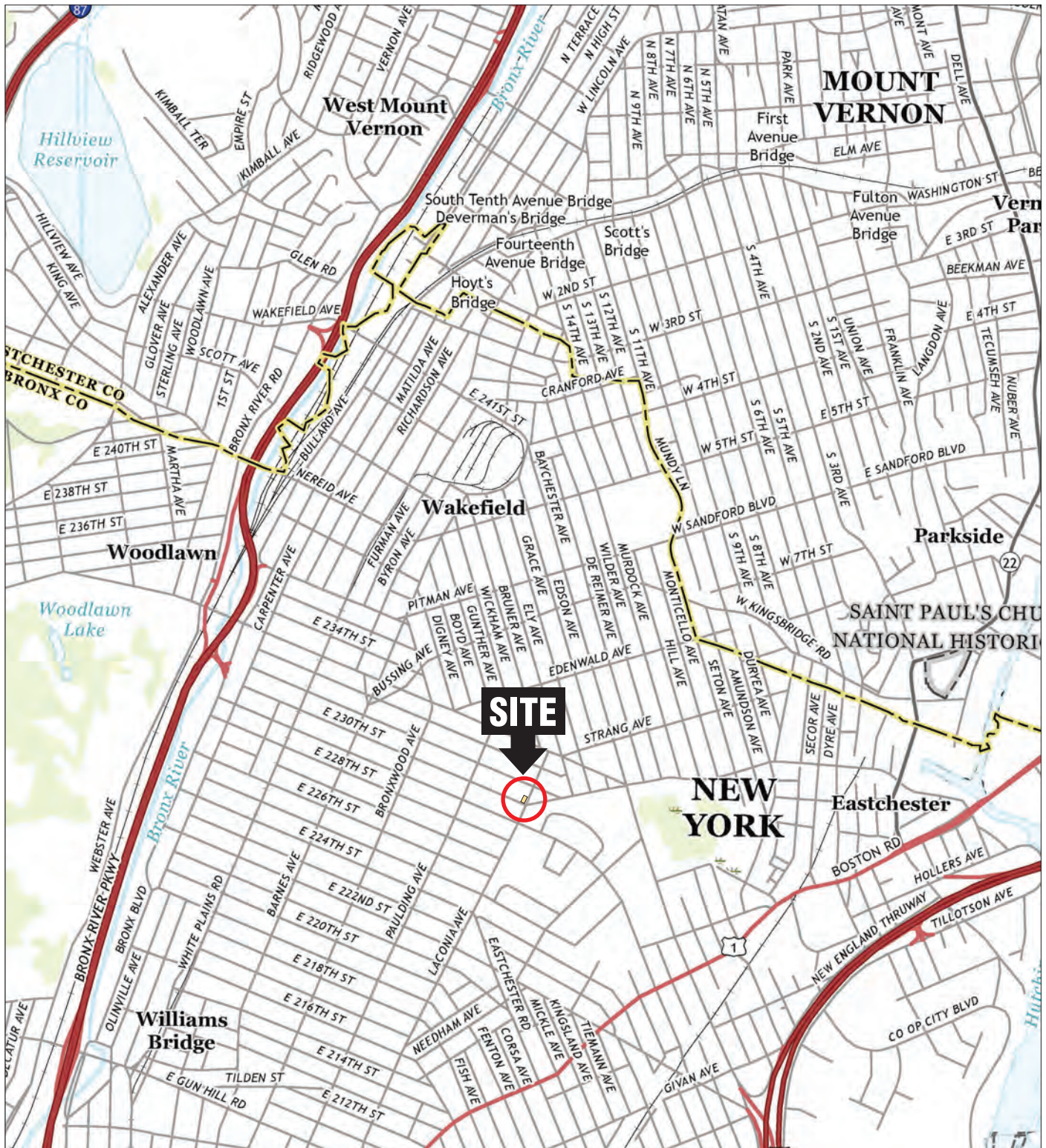
**Site-Specific Health and Safety Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**FIGURES**

1. Site Location Map
2. Site Plan with Emergency Muster Area
3. Route to Hospital
4. Route to Urgent Care

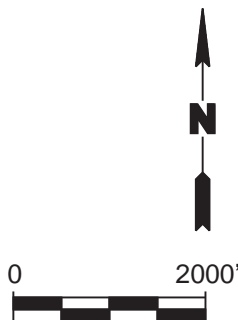




QUADRANGLE LOCATION



SOURCE:  
USGS; 2016, Mount Vernon, NY  
7.5 Minute Topographic Quadrangle



Title:

## SITE LOCATION MAP

4125-4149 LACONIA AVENUE  
BRONX, NEW YORK

Prepared for:

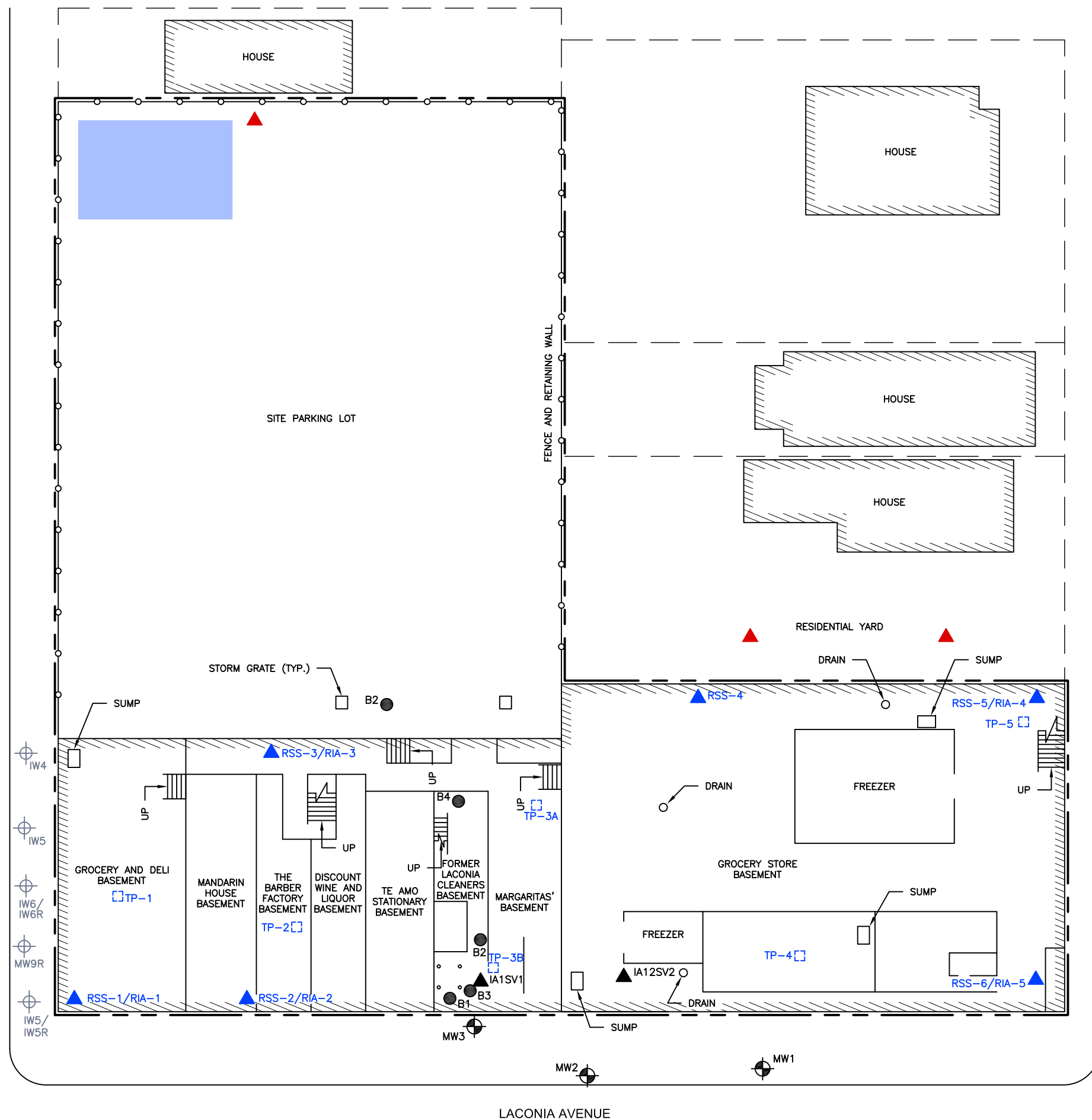
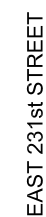
LACONIA PROPERTIES

**ROUX**

Compiled by: J.W.	Date: 13SEP19
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: J.W.	Project: 3390.0001Y000
File: 3390.0001Y100.01.CDR	

FIGURE

1



### LEGEND

PROPERTY BOUNDARY

APPROXIMATE LOCATION AND DESIGNATION OF EXISTING  
MONITORING WELL INSTALLED BY MERRITT ENVIRONMENTAL  
IN 2019

APPROXIMATE LOCATION AND DESIGNATION OF EXISTING  
INSPECTION AND/OR MONITORING WELL INSTALLED BY  
OTHERS

APPROXIMATE LOCATION AND DESIGNATION OF SOIL BORING  
INSTALLED BY MERRITT ENVIRONMENTAL

APPROXIMATE LOCATION AND DESIGNATION OF INDOOR AIR  
AND SUB SLAB SOIL VAPOR SAMPLE LOCATION INSTALLED  
BY MERRITT ENVIRONMENTAL

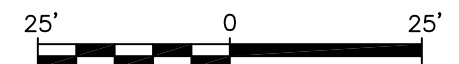
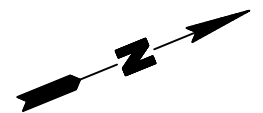
APPROXIMATE LOCATION AND DESIGNATION OF SUB SLAB  
SOIL VAPOR AND INDOOR AIR SAMPLE COLLECTED BY  
ROUX

APPROXIMATE LOCATION AND DESIGNATION OF  
EXPLORATORY TEST PIT (ONE FOOT LONG BY ONE FOOT  
WIDE) INSTALLED BY ROUX

PROPOSED LOCATION OF SOIL VAPOR SAMPLE

APPROXIMATE LOCATION OF FORMER DRY CLEANING  
MACHINE SUPPORT COLUMNS (BASEMENT)

EMERGENCY MUSTER AREA



**Title:**

## SITE PLAN AND EMERGENCY MUSTER AREA

4125-4149 LACONIA AVENUE  
BRONX, NEW YORK

Prepared for:

LACONIA PROPERTIES LLC

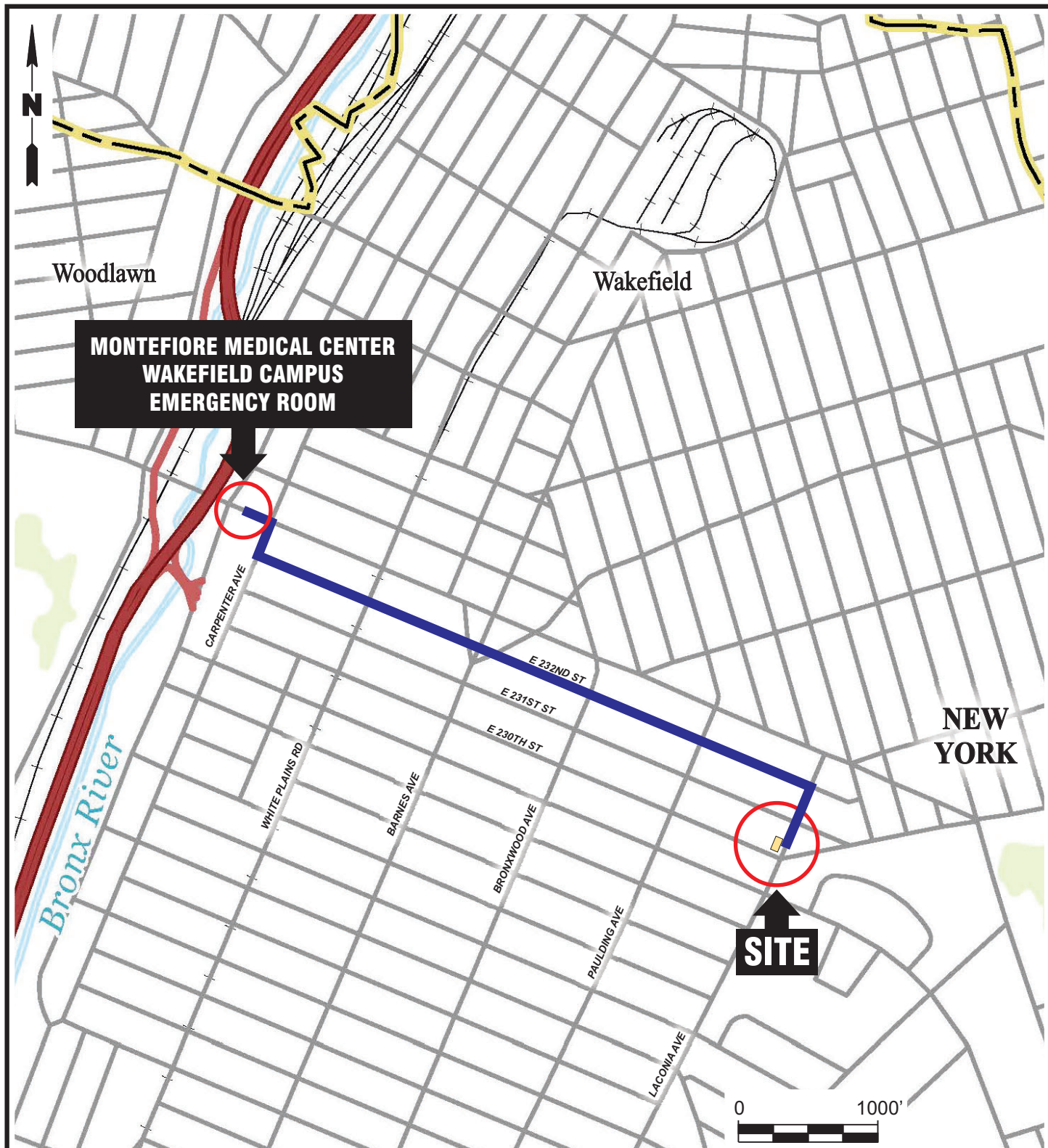
**ROUX**

Compiled by: J.W.	Date: 18OCT19
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: J.W.	Project: 3390.0001Y000
File: 3390.0001Y104.01.DWG	

FIGURE

2





#### Directions to Montefiore Medical Center, Wakefield Campus

1. Head northeast on Laconia Avenue towards E231st Street.
2. Turn left onto E232nd Street.
3. Turn right onto Carpenter Avenue.
4. Turn left, Medical Center on left.

Title:

## HOSPITAL ROUTE MAP

4125-4149 LACONIA AVENUE  
BRONX, NEW YORK

Prepared for:

LACONIA PROPERTIES

**ROUX**

Compiled by: J.W.

Date: 13SEP19

Prepared by: G.M.

Scale: AS SHOWN

Project Mgr: J.W.

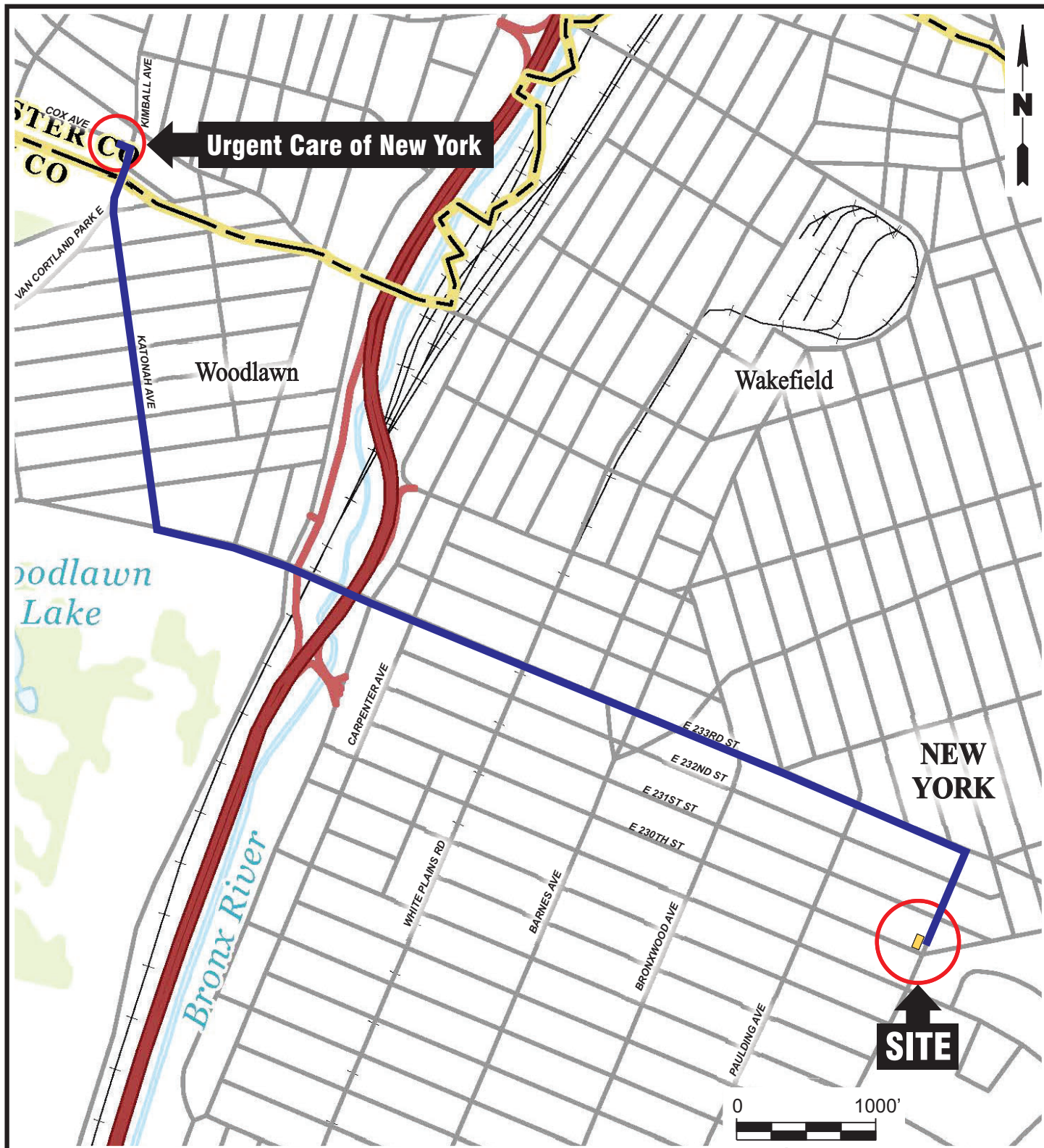
Project: 3390.0001Y000

File: 3390.0001Y100.01.CDR

FIGURE

**3**





#### Directions to Urgent Care of New York

1. Head northeast on Laconia Avenue towards E231st Street.
2. Turn left onto E233rd Street.
3. Turn right onto Katonah Avenue.
4. Slight right onto Van Cortland Park East.
5. Continue onto Kimball Avenue.
6. Turn left onto Cox Avenue, Urgent Care on right.

Title:

### URGENT CARE ROUTE MAP

4125-4149 LACONIA AVENUE  
BRONX, NEW YORK

Prepared for:

LACONIA PROPERTIES

**ROUX**

Compiled by: J.W.	Date: 13SEP19
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: J.W.	Project: 3390.0001Y000
File: 3390.0001Y100.01.CDR	

FIGURE

**4**



**APPENDICES**

- A. Job Safety Analysis (JSA) Forms
- B. SDSs for Chemicals Used
- C. Personal Protective Equipment (PPE) Management Program
- D. Subsurface Utility Clearance Management Program
- E. Heavy Equipment Exclusion Zone Policy
- F. Generic Community Air Monitoring Plan

**Site-Specific Health and Safety Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**APPENDIX A**

Job Safety Analysis (JSA) Forms

<b>JOB SAFETY ANALYSIS</b>		<b>Cntrl. No. GEN-010</b>	DATE: 10/2/2019	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>GENERIC</b>		WORK TYPE <b>Site Recon</b>	WORK ACTIVITY (Description) <b>Mobilization/Demobilization</b>		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Jeff Wills		Senior Hydrogeologist	Levi Curnutte	SHSM	
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel Toe or composite toe</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest of high-visibility clothing;</u> <u>long sleeve shirt; long pants</u>		<input type="checkbox"/> GLOVES: <u>Leather, nitrile, and cut resistant (as needed)</u> <input type="checkbox"/> OTHER
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Required Equipment:					
<b>Commitment to LPS</b> – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.					
<b>EXCLUSION ZONE:</b> A minimum exclusion zone of 10' will be maintained around moving equipment (if necessary)					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Mobilize/demobilize and establish work area		<b>1a. FALL:</b> Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.  <b>1b. CONTACT:</b> Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.  <b>1c. CAUGHT:</b> Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.		1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle. 1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways. Walk on stable/secure ground. 1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping; organize and store equipment neatly in one area. 1a. Wear boots with adequate treads. 1a. Delineate unsafe areas with 42" cones, caution tape and/or flagging.  1b. Observe and maintain the posted speed limits. 1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers. 1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities. Ensure that short-service employees (SSE) are identified. 1b. Identify potential traffic sources. 1b. Wear PPE including high visibility clothing or reflective vest. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing when unnecessary. 1b. Maintain a minimum 10' exclusion zone when vehicles are in motion. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1b. Delineate work area with 42" cones, flags, caution tape, and/or other barriers. 1b. Position "Work Area" signs at Site entrances, if possible, or at either side of work area. 1b. Position largest vehicle to protect against oncoming traffic. 1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route.  1c. Make sure driver has engaged parking brake and placed wheel chocks in a position to prevent movement. Be sure that vehicle is parked in front/down gradient of work area. 1c. Wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools/glass. 1c. Keep body parts away from line-of-fire of equipment. 1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure. 1c. Remove any loose jewelry. Avoid wearing loose clothing and/or ensure loose clothing is secure.	

<sup>1</sup> Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

<sup>2</sup> A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
	<p><b>1d. OVEREXERTION:</b> Muscle strains while lifting/carrying equipment.</p> <p><b>1e. EXPOSURE:</b> Personal injury from exposure to biological and environmental hazards.</p> <p><b>1f. EXPOSURE:</b> Heat and cold related injuries.</p> <p><b>1g. EXPOSURE:</b> Personal injury from noise hazards.</p>	<p>1d. Use body positioning and lifting techniques that avoid muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load.</p> <p>1d. Ensure that loads are balanced. Use assistance (mechanical or additional person) to carry equipment that is either unwieldy or over 50 lbs.</p> <p>1e. Inspect area to avoid contact with biological hazards (i.e. poisonous plants, stinging insects, ticks, etc.).</p> <p>1e. Wear long sleeved clothes treated with permethrin, apply insect repellent containing DEET, and inspect clothes and skin for ticks during and after work.</p> <p>1e. Apply sunscreen (SPF 15+) if exposure to sun for 30 minutes or more is expected.</p> <p>1f. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.</p> <p>1f. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.</p> <p>1f. Wear clothing appropriate for weather and temperature conditions (e.g., rain jackets, snow pants, multiple layers).</p> <p>1f. If lightning is observed, wait 30 minutes in a sheltered location (car is acceptable) before resuming work.</p> <p>1g. Wear hearing protection if sound levels exceed 85 (if you must raise your voice for normal conversation).</p>

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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

<b>JOB SAFETY ANALYSIS</b>		<b>Cntrl. No. GEN-009</b>	DATE: 10/2/2019	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
<b>JSA TYPE CATEGORY</b> <b>GENERIC</b>		<b>WORK TYPE</b> <b>Hand Tools</b>	<b>WORK ACTIVITY (Description)</b> <b>Pre-Clearing activities, including Air Knifing and Soil Vacuuming</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>		
Jeff Wills	Senior Hydrogeologist	Levi Curnutte	SHSM		
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD (while air knifing) <input checked="" type="checkbox"/> HEARING PROTECTION (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or composite toed</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Dust mask (as needed)</u>		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Required Equipment: Air Knife, Vactor Truck (Vac Truck), Compressor, Hand Tools, Photoionization Detector, Multi-Gas Meter, Traffic Cones, 20 lb. Fire Extinguisher, "Work Area" and/or "Exclusion Zone" Signs					
<b>Commitment to LPS</b> – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.					
<b>EXCLUSION ZONE: A 10 foot exclusion zone will be maintained around air knife and/or soil vacuum operations.</b>					
<b>Assess</b> <b>1JOB STEPS</b>	<b>Analyze</b> <b>2POTENTIAL HAZARDS</b>	<b>Act</b> <b>3CRITICAL ACTIONS</b>			
1. Verify pre-clearance protocol.	1a. <b>CONTACT:</b> Underground utility damage; property damage; personal injury.  See Site Walk Inspection JSA for potential hazards.	1a. Confirm that local utility companies were contacted prior to drilling. 1a. Walk the Site to evaluate utility markings and review maps ( <b>See Site Walk Inspection JSA for critical actions</b> ). 1a. Review pre-clearing checklist form and sub-surface clearance form. Pre-clearing protocol indicates that clearance must be conducted to a minimum of 5 vertical feet below ground surface or 8 vertical feet below ground surface in the critical zone using hand tools.			
2. Mobilize/demobilize and establish work area.	2a. <b>See Mobilization / Demobilization JSA for potential hazards.</b>	2a. <b>See Mobilization / Demobilization JSA for critical actions.</b>			
3. Pre-clear with air knife and soil vacuum, and/or clearance with hand tools	3a. <b>CONTACT:</b> Flying debris.  3b. <b>EXPOSURE/ENERGY SOURCE:</b> Inhalation/exposure to hazardous vapors; inhalation/exposure to dust; electrocution.  3c. <b>CONTACT:</b> Damage to unknown/known utility with air knife.  3d. <b>OVEREXERTION:</b> Poor body positioning when handling equipment and materials.	3a. <b>Maintain 10 foot exclusion zone.</b> Only (air knife/vac truck) operator and designated helper shall remain within exclusion zone while air knife/vac truck is active. Use the required PPE, including (at a minimum), cut resistant gloves, safety glasses with side shields, and long sleeved shirt. 3a. Wear a face shield to protect face from flying debris when using air knife. 3a. Aim air knife tip away from self and others, so to avoid line-of-fire hazards. 3a. Use anti-whip devices on compressor hoses.  3b. Monitor breathing zone with a calibrated PID and multi-gas meter. If vapors sustain levels > 5 ppm, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux Project Manager of the condition. The Roux Project Manager will then recommend additional precautions. 3b. Wear dust masks as needed. 3b. Ensure no open flames/heat sources are present within the work area. 3b. Ensure vac truck is properly grounded prior to use. 3b. Do not use metal dig bar; use fiberglass or equivalent.  3c. Avoid contacting utilities directly with the high pressure air stream and using the air knife tip as a physical digging tool. 3c. Keep the air knife tip constantly moving to reduce direct pressure on a potential utility. 3c. Increase the distance between air knife tip and soil/utility. 3c. Continually remove soil slurry from hole with vacuum, which may have an abrasive effect on utility casings.  3d. Use proper body positioning and lifting techniques that minimizes muscle strain; keep back straight, lift with legs, keep			

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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."

		load close to body, and never reach with a load.
3. Pre-clearing with air knife and soil vacuum, and/or clearance with hand tools (continued)	<p>3d. <b>OVEREXERTION:</b> (continued) Poor body positioning when handling equipment and materials.</p> <p>3e. <b>FALL:</b> Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site.</p> <p>3f. <b>CAUGHT:</b> Pinch points associated with the equipment and vacuum hose.</p> <p>3g. <b>EXPOSURE:</b> Noise from vac truck and/or air compressor.</p>	<p>3d. Ensure that loads are balanced to reduce the potential for muscle strain.</p> <p>3d. Two people or a mechanical lifting aid are required when lifting objects over 50 lb. or when the shape makes the object difficult to lift.</p> <p>3e. Inspect walking path for uneven terrain, weather-related hazards (e.g., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.</p> <p>3e. Walk around any stored materials/equipment; do not climb over. Practice good housekeeping.</p> <p>3e. Use established pathways and walk on stable, secure ground.</p> <p>3e. Equipment and tools will be stored at the lowest point of potential energy and out of the walkway and immediate work area (i.e., tools should not be propped against walls or nearby equipment or vehicles).</p> <p>3e. Equipment and tools that are not anticipated to be used will be returned to a storage area that is out of the immediate work area.</p> <p>3e. Ensure power cords/hoses are grouped when used within the work area. Mark out cords/hoses that cross pathways with traffic cones.</p> <p>3e. Ensure all Site personnel and equipment stay a minimum of 2 feet from an open hole. Mark out open holes with traffic cones/caution tape, etc.</p> <p>3e. Pre-cleared location will be finished flush to grade as to prevent a slip/trip hazard.</p> <p>3f. Always wear cut-resistant gloves when making connections and using hand tools.</p> <p>3f. Inspect the equipment prior to use for potential pinch points.</p> <p>3f. Test all emergency shutdown devices prior to using equipment.</p> <p>3f. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>3f. <b>All non-essential personnel shall maintain a 10 foot exclusion zone;</b> position body out of the line-of-fire of equipment.</p> <p>3f. <b>Drillers and helpers will understand and use the "Show Me Your Hands Policy".</b></p> <p>3g. Wear hearing protection when vac truck and air compressor are in operation. Otherwise, if sound levels exceed 85 dB, don hearing protection.</p>
4. Move drum to staging area using drum cart.	<p>4a. <b>EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil).</p> <p>4b. <b>EXERTION:</b> Muscle strain while maneuvering drums with drum cart/lift gate.</p> <p>4c. <b>CAUGHT:</b> Pinch points associated with handling drum lid.</p>	<p>4a. Wear chemically resistant gloves (i.e., Nitrile; worn in addition to cut resistant gloves).</p> <p>4a. Do not overfill drums. Ensure that the drum lids are attached securely.</p> <p>4a. Stage all drums in the designated storage area (per Roux Project Manager) and ensure they are labeled.</p> <p>4b. See 3d. Do not overfill drums. Use lift gate on back of truck to load and unload drums or drum cart to transport drums.</p> <p>4c. Ensure that fingers are not placed under the lid of the drum. Wear cut-resistant gloves. Use 15/16" ratchet while sealing drum lid.</p>
5. Decontaminate equipment and tools.	<p>5a. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p>5b. <b>EXPOSURE:</b> To chemicals in cleaning solution.</p>	<p>5a. See 4a.</p> <p>5a. Contain decontamination water (closed lid) so that it does not spill.</p> <p>5a. Use an absorbent pad to clean spills, if necessary.</p> <p>5a. Store all impacted materials/PPE in a designated storage container (per Roux Project Manager) and ensure the container is labeled.</p> <p>5b. See 4a.</p>

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Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

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<b>JOB SAFETY ANALYSIS Ctrl. No. GEN-004</b>		DATE 10/2/2019	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>Generic</b>	WORK TYPE: <b>Drilling</b>	WORK ACTIVITY (Description): <b>Direct Push Soil Borings / Well Installation</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Jeffrey Wills	Senior Hydrogeologist	Levi Curnutte	SHSO	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION: (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toe or steel toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing, Long Sleeve Shirt</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellent, sunscreen (as needed)</u>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
Geoprobe or Truck-Mounted Direct Push Drill Rig, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Macrocore liners, Liner Opening Tool, 20 lb. Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs, Water				
<b>COMMITMENT TO LPS</b> - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.				
<b>Exclusion Zone Policy</b> – All non-essential personnel will maintain a distance of 10' feet from drilling equipment while moving/engaged.				
<b>"SHOW ME YOUR HANDS"</b>				
<b>Driller and helper should show that hands are clear from controls and moving parts</b>				
<b>Assess 1<sup>1</sup>JOB STEPS</b>	<b>Analyze 2<sup>2</sup>POTENTIAL HAZARDS</b>	<b>Act 3<sup>3</sup>CRITICAL ACTIONS</b>		
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	1a. <b>CONTACT:</b> Equipment/property damage.  1b. <b>FALL:</b> Slip/trip/fall hazards.	1a. The drill rig's tower/derrick will be lowered and secured prior to mobilization. 1a. A spotter should be utilized while moving the drill rig. If personnel move into the path of the drill rig, the drill rig will be stopped until the path is again clear. Use a spotter for all required backing operations. 1a. Set-up the work area and position equipment in a manner that eliminates or reduces the need for backing of support trucks and trailers. 1a. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed. 1a. Drill rig should have a minimum <b>exclusion zone of 10 feet</b> for non-essential personnel (i.e., driller helper, geologist) when the rig is moving/ in operation.  1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1b. Use established pathways and walk on stable, secure ground.		
2. Raising tower/derrick of drill rig	2a. <b>CONTACT:</b> Overhead hazards.  2b. <b>CONTACT:</b> Pinch Points when raising the rig and instability of rig	2a. Prior to raising the tower/derrick, the area above the drilling rig will be inspected for wires, tree limbs, piping, or other structures, that could come in contact with the rig's tower and/or drilling rods or tools. 2a. Maintain a safe distance from overhead structures.  2b. Inspect the equipment prior to use and avoid pinch points. 2b. Lower out riggers on rig to ensure stability prior to raising rig tower/derrick. 2b. If the rig needs to be mounted, be sure to use three points of contact.		
3. Advancement of drilling equipment and well installation	3a. <b>CONTACT:</b> Flying debris	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection.		

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<p>3. Advancement of drilling equipment and well installation (Continued)</p>	<p>3b. <b>EXPOSURE:</b> Noise and dust.</p> <p>3c. <b>CAUGHT:</b> Limb/extremity pinching; abrasion/crushing.</p> <p>3d. <b>CONTACT:</b> Equipment imbalance during advancement of drill equipment.</p> <p>3e. <b>EXPOSURE:</b> Inhalation of contamination/vapors.</p> <p>3f. <b>FALL:</b> Slip/trip/fall hazards.</p> <p>3g. <b>EXERTION:</b> Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.</p>	<p>3b. Wet borehole area with sprayer to minimize dust. 3b. Stand upwind and keep body away from rig. 3b. Dust mask should be worn if conditions warrant. 3b. Wear hearing protection when the drill rig is in operation.</p> <p>3c. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 3c. Inspect the equipment prior to use for potential pinch points. Keep hands away from being between pinch points and use of tools is preferable compared to fingers and hands. 3c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. 3c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy. 3c. Spinning rods/casing have an <b>exclusion zone of 10 feet</b> while in operation.</p> <p>3d. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 3d. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred. 3d. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (<b>minimum exclusion zone of 10 feet</b>).</p> <p>3e. Air monitoring using a calibrated photoionization detector (PID) will be used to periodically to monitor the breathing zone of the work area. 3e. If a reading of &gt;5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional precautions in accordance with the site specific health and safety plan.</p> <p>3f. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area. 3f. See 1b.</p> <p>3g. Keep back straight and bend at the knees. 3g. Utilize team lifting for objects over 50lbs. 3g. Use mechanical lifting device for odd shaped objects.</p>
<p>4. Decontaminate equipment.</p>	<p>4a. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p>4b. <b>EXPOSURE:</b> To chemicals in cleaning solution including ammonia.</p>	<p>4a. Wear chemical-resistant disposable gloves and safety glasses. 4a. Contain decontamination water so that it does not spill. 4a. Use an absorbent pad to clean spills, if necessary. 4a. See 3b.</p> <p>4b. See 4a. Review MSDS to ensure appropriate precautions are taken and understood.</p>

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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".



<b>JOB SAFETY ANALYSIS</b> Cntrl#: GEN-015		DATE 10/2/2019	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>GENERIC</b>	WORK TYPE: <b>Drilling</b>	WORK ACTIVITY (Description): <b>Well Development</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Jeff Wills	Senior Hydrogeologist	Levi Curnutte	SHSM	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toe or steel toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Insect repellent, sunscreen (as needed)</u>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
Required Equipment as needed: Truck Rig or support truck, Trailer, 42 inch Safety cones and flags, Caution Tape, Interface Probe, Power Source, Submersible Pump, Surge Block/Plunger, 20 lb. Fire Extinguisher, Holding Tanks and/or Buckets, Tools as needed: Socket and Pipe Wrench, Screw Driver, Pry Bar, Ratchet, Vault Key.				
<b>COMMITMENT TO LPS</b> - All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.				
<b>Maintain a 20 Foot Exclusion Zone During Development Activities</b>				
<b>"SHOW ME YOUR HANDS"</b> <b>Driller and helper should show that hands are clear from controls and moving parts</b>				
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>		
1. Mobilization / Demobilization <b>(Review Mobilization and Demobilization JSA)</b>	1a. <b>CONTACT:</b> Equipment/property damage.  1b. <b>FALL:</b> Slip/trip/fall hazards.	1a. The truck rig's tower/derrick will be lowered and secured prior to mobilization. 1a. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers. 1a. All non-essential personnel should <b>maintain an exclusion zone of 20 feet.</b> 1a. Beep horn twice before backing up. 1a. When backing up with an attached trailer use a spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. Stay away from the line-of-fire. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed.  1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Store equipment at lowest potential energy.		
2. Open/close well.	2a. <b>OVEREXERTION:</b> Muscle strain (some wells have large vault covers).  2b. <b>CAUGHT:</b> Pinch points associated with removing/replacing manholes and working with hand tools.  2c. <b>EXPOSURE:</b> Potentially hazardous vapors.  2d. <b>CONTACT:</b> Traffic.	2a. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Two people are required when lifting objects over 50 lbs or when the shape makes the object difficult to lift.  2b. Wear leather gloves when working with well vault/cover and hand tools. Do not put fingers under well vault/cover. 2b. Use ratchet and pry bar for well cover and inspect before use.  2c. No open flames/heat sources. 2c. Allow well to vent after opening it and before starting development activities to minimize exposure to vapors. Air monitoring must be performed prior to set up and during the well development activities. Work on upwind side of well.  2d. Wear required PPE including high visibility clothing or reflective vest. 2d. Delineate work area with 42" safety cones and/or other barriers. Position vehicle to protect against oncoming traffic. 2d. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.		

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<sup>2</sup> A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – Electricity, Pressure, compression, tension, torque.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
3. Develop well (mechanical surging).	<p>3a. <b>CAUGHT:</b> Cut hazards and finger pinch points.</p> <p>3b. <b>CONTACT/EXPOSURE:</b> Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>3c. <b>OVEREXERTION:</b> Muscle strain from lifting equipment.</p> <p>3d. <b>CONTACT:</b> Injury while handling wench line/cable, or with active surging equipment</p>	<p>3a. See 2b.</p> <p>3a. Use required PPE including leather/cut-resistant gloves when handling development equipment. Identify finger/hand pinch points. Keep hands away from active surge equipment.</p> <p>3a. All non-essential personnel should <b>maintain an exclusion zone of 20 feet.</b></p> <p>3b. See 2c.</p> <p>3b. Wear Nitrile gloves and safety glasses. Insert and remove surge block/plunger and line/cable slowly to avoid splashing at the surface.</p> <p>3b. Use an absorbent pad to clean any spills.</p> <p>3c. See 2a.</p> <p>3c. Use mechanical device to insert and remove surge block/plunger if greater than 50lb.</p> <p>3d. If using a drill rig, inspect all wench lines/cables for any kinks or if frayed prior to use. Replace any damaged lines/cables. Review <b>Drill Rig checklist prior to development activities.</b></p> <p>3d. See 3a.</p>
4. Purging well (pumping water to holding tanks/drums/buckets).	<p>4a. <b>CAUGHT:</b> Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses.</p> <p>4b. <b>FALL:</b> Using side mounted ladder when attaching hose to tank.  Slip, trip, fall from lines/hoses</p> <p>4c. <b>CONTACT:</b> Contamination (e.g., SPH, contaminated groundwater).</p> <p>4d. <b>EXERTION:</b> Muscle strain from lifting/carrying equipment.</p> <p>4e. <b>FALL:</b> Spilled purge water.</p>	<p>4a. See 3a.</p> <p>4a. Ensure that fingers are not placed near coupling when attaching and securing hose(s). Do not place fingers under pump/hoses. Wear leather or cut-resistant gloves when handling pump/hose(s).</p> <p>4a. Keep hands clear from any line of fire.</p> <p>4b. Inspect ladder steps make sure steps are not bent/damaged and free of debris/fluid.</p> <p>4b. Use three points of contact at all times when using ladder.</p> <p>4b. Utilize anti-whip cords on all compressed hoses. Keep hoses and lines coiled and organized out of designated walking paths around the work zone.</p> <p>4c. Secure water hose.</p> <p>4c. Do not overfill tanks, and purge/transfer liquids in such a manner that they do not splash. (See 3b).</p> <p>4c. Dispose of used materials/PPE in the designated impacted PPE container.</p> <p>4d. Use lifting techniques to minimize muscle strain when carrying equipment. When possible, use mechanic means to lift equipment.</p> <p>4d. Use two people to lift any equipment or material that is over 50 lbs.</p> <p>4e. Clean up any spills using absorbent pads or spill kits.</p>
5. Decontaminate equipment	<p>5a. <b>CONTACT/EXPOSURE:</b> Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. <b>EXPOSURE/CONTACT:</b> Chemicals in cleaning solution</p>	<p>5a. See 3b.</p> <p>5b. Decontaminate equipment in well-ventilated area. Wear nitrile gloves to avoid skin contact with cleaning solutions.</p>

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<b>JSA TYPE CATEGORY</b> <b>Generic</b>		<b>WORK TYPE:</b> <b>Gauging and Sampling</b>	<b>WORK ACTIVITY (Description):</b> <b>Gauging and Sampling</b>
<b>DEVELOPMENT TEAM</b> Jeff Wills		<b>POSITION / TITLE</b> Senior Hydrogeologist	<b>REVIEWED BY:</b> Levi Curnutte
			<b>POSITION / TITLE</b> SHSM
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>			
<input checked="" type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toe or steel toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Knee pads, Insect Repellant, sunscreen (as needed)</u>
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>			
42 inch Safety Cones, Caution Tape, Interface Probe and/or Water Level Meter, 20 lb. Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Impact Gun, Screw Driver, Crow Bar, Mallet, and Wire Brush.			
<b>Commitment to LPS – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.</b>			
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>	
1. Mobilization to monitoring well(s).	1a. <b>FALL:</b> Personal injury from slip/trip/fall due to uneven terrain and/or obstructions.  1b. <b>CONTACT:</b> With traffic/third parties.  1c. <b>EXPOSURE:</b> To biological hazards.	1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure, ground and avoid steep hills or uneven terrain. 1a. If working near open water with an unguarded edge, wear life vest.  1b. Identify potential traffic sources and delineate work area with 42 inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.  1c. Inspect work area for bees and insects. 1c. Use insect/tick repellent as necessary.	
2. Open/close well.	2a. <b>ERGONOMICS:</b> Muscle strain.  2b. <b>CAUGHT:</b> Pinch/crush points associated with removing/replacing manholes and working with hand tools.  2c. <b>CAUGHT:</b> Pinch points associated with placing J-plug back onto PVC pipe.  2d. <b>EXPOSURE:</b> To potential hazardous vapors.	2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well.  2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar/impact gun for well cover) and inspect before use. 2b. Do not put fingers under well cover.  2c. See 2b. 2c. Keep fingers out of line-of-fire when securing cap  2d. No open flames/heat sources. 2d. To minimize exposure to vapors allow well to vent after opening it and before sampling activities begin. 2d. Stand up-wind, if possible, to avoid vapors.	
3. Gauge well.	3a. <b>CONTACT:</b> With contamination (e.g. contaminated groundwater).  3b. <b>CONTACT:</b> With traffic.	3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe.  3b. See 1b.	
4. Purge and sample well.	4a. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives.	4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives. 4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling. 4a. Fill sample containers over purge container to avoid spilling water onto the ground. 4a. Use an absorbent pad to clean spills. 4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards. 4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater.	

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		<p>4a. When using a tubing valve always remove the valve slowly after sample collection to release any pressure and avoid pressurized splash hazards</p> <p>4a. When collecting a groundwater sample always point sampling apparatus (tubing, bailer, etc.) away from face and body.</p>
Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
4. Purge and sample well (Continued).	<p>4b. <b>CONTACT:</b> Personal injury from cuts, abrasions, or punctures by glassware or sharp objects.</p> <p>4c. <b>ERGONOMICS:</b> Muscle strain while carrying equipment.</p> <p>4d. <b>CONTACT:</b> With traffic.</p> <p>4e. <b>CONTACT:</b> Pinch points with groundwater pump components (i.e. wheel, line, clamps)</p> <p>4f. <b>ERGONOMICS:</b> Muscle strain from repetitive motion of bailing and sampling a well</p>	<p>4b. To avoid spills or breakage, place sample ware on even surface.</p> <p>4b. Do not over tighten caps on glass sample ware.</p> <p>4b. Wear chemical-resistant nitrile disposable gloves over cut-resistant (i.e. Kevlar) gloves when sampling and handling glassware (i.e., VOA vials) or when using cutting tools.</p> <p>4c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight.</p> <p>4c. Use mechanical assistance or team lifting techniques when equipment is 50lbs or heavier.</p> <p>4c. Make multiple trips to carry equipment.</p> <p>4d. See 1b.</p> <p>4e. Wear leather gloves when working with groundwater pumps</p> <p>4e. Never place hands on or near pinch points such as the wheel, clamps or other moving parts during pump operations</p> <p>4e. Use correct the correct mechanisms, such as a pump reel, to lower pump into well</p> <p>4e. Never attempt to manually stop any moving part of equipment including hose reels and/or tubing.</p> <p>4f. See 4c.</p> <p>4f. Include a stretch break when repetitive motions are part of the task.</p>
5. Management of purge water.	<p>5a. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. <b>ERGONOMICS:</b> Muscle strain from lifting/carrying and moving containers.</p>	<p>5a. Do not overfill container and pour liquids in such a manner that they do not splash.</p> <p>5a. Properly dispose of used materials/PPE in appropriate container in designated storage area.</p> <p>5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.).</p> <p>5b. Do not overfill container(s).</p>
6. Decontaminate equipment.	<p>6a. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>6b. <b>CAUGHT:</b> Pinch points associated with handling hand tools</p>	<p>6a. Work on the upwind side, where possible, of decon area.</p> <p>6a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>6a. Use an absorbent pad to clean spills.</p> <p>6b. See 2b.</p> <p>6b. Inspect hand tools for sharp edges before decontaminating</p>

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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

<b>JOB SAFETY ANALYSIS</b>		<b>Ctrl. No. GEN-009</b>	DATE: 12/3/2019	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JLA TYPE CATEGORY <b>Generic</b>		WORK TYPE <b>Construction - Excavation</b>		WORK ACTIVITY (Description) <b>Excavation / Trenching</b>	
DEVELOPMENT TEAM		POSITION / TITLE		REVIEWED BY:	POSITION / TITLE
David Kaiser		Senior Engineer		Brian Hobbs	Senior Health & Safety Manager
				Jeff Wills	Senior Hydrogeologist
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input checked="" type="checkbox"/> LONG SLEEVED SHIRT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel-toe boots</u>		<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest with long sleeved shirt or high visibility long sleeved clothing</u> <input checked="" type="checkbox"/> GLOVES: <u>Leather or cut resistant</u> <input type="checkbox"/> OTHER	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Jackhammer, Excavator, Backhoe, Hand Tools, Photoionization Detector, barrels, 42" traffic cones, snow fencing, telescoping poles, temporary chain link fence, ladders, shovels, digging bars, power tools (cut-off saw), Two-way radios, Sheeting, Trench box, Retractable lanyard, Harness					
<b>COMMITMENT TO LPS-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs					
<b>EXCLUSION ZONE (EZ): A 10-foot exclusion zone will be maintained around equipment in motion and outside the swing/tip radius.</b>					
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>		
1. Pre-Clearance Protocol.	<b>1a. CONTACT:</b> Damage to underground utility.  <b>1b. ENERGY SOURCE/CONTACT:</b> Property damage; Pressurized water mains may cause lacerations or broken bones. Pressurized gas mains may explode causing serious injury, or death.  Underground electric may cause severe burns, shock, or death.  <b>1c. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones.		1a. Confirm that (if applicable) "Call Before You Dig" and local utility companies were contacted prior to trenching in order to confirm utility mark outs. Must have a case # before digging.  1b. Pre-clearing of the trenching location must be conducted to a minimum of 5 vertical feet below the ground surface (10 feet minimum for Critical Zone) using hand tools (shovel and non-metallic dig bar) prior to trenching. Supervisor should be contacted to discuss appropriate pre-clearing depth. Complete subsurface clearance checklist.  1c. Be aware of the conditions when walking or loading equipment and working. Walk within established pathway avoiding uneven surfaces. Remove potential slip/trip/fall hazards.		
2. Set up work zone.	<b>2a. CONTACT/CAUGHT:</b> Cuts/lacerations from equipment. Broken bones from contact by vehicle.  <b>2b. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones.		2a. Isolate work area from hazards with cones, barricades, and snow fencing, telescoping poles or temporary chain link fence. Utilize a flag person when necessary (i.e., third party traffic in area). Install traffic signs in roadways and for detours. Spotters will maintain and enforce exclusion zone.  2b. See 1c.		

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Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards, energy source; Energy Source - electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
3. Trenching Activity.	<p><b>3a. CONTACT:</b> Serious injury including broken bones, muscle strains or tears, and possibly death due to contact with machine.</p> <p><b>3b. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones</p> <p><b>3c. EXPOSURE:</b> Noise, Dust, Concrete- Asphalt, petroleum hydrocarbon vapors may cause damage to ears and lungs</p>	<p>3a. Spotter(s) required for all heavy equipment operation. No worker shall be allowed inside the exclusion zone or along the trench/excavation area while any equipment is in operation. A minimum exclusion zone greater than the length of the equipment boom must be established. Workers only allowed in exclusion zone if the operator is in "Hands Off" mode. Operator will not operate equipment until worker is out of exclusion zone. Spotters and operators will have radios for communication, when either loses sight of one another, and/or in case of emergency.</p> <p>3b. Any trench/excavation deeper than 3' must have a ladder within 25' of any worker in the excavation. At least 3' (rungs) of the ladder shall be above the top of the excavation. All spoil piles shall be maintained 2' minimum from edge of excavation.</p> <p>3b. Any trench/excavation deeper than 6' must have fall protection, retractable lanyard for ladder use, and 42" high guardrails along the edge of the trench/excavation.</p> <p>3c. Air monitoring using a calibrated photoionization detector (PID) will be used to monitor the breathing zone of the work area. If a reading of &gt;5ppm is recorded, the oversight personnel must temporarily cease work and instruct all Site personnel to step away from the area of elevated readings.</p>
4. Setting Trench protections if necessary.	<p><b>4a. CAUGHT:</b> Injury due to contact with failed trench, may include muscle strains or tears, abrasions or lacerations, broken bones and possibly death.</p> <p><b>4b. CONTACT/CAUGHT:</b> Injury due to rigging activities and entering exclusion zone during lifting and/or transport of shoring/trench box/material may include muscle strains or tears, abrasions or lacerations, broken bones and possibly death.</p> <p><b>4c. FALL:</b> Possible injury due to fall into excavation may include muscle strains or tears, abrasions or lacerations, or broken bones.</p>	<p>4a. To prevent cave-ins and avoid caught by/between, excavations over 4' in depth, unless working in stable rock, shall have engineer approved shoring, sheeting or trench box. Top of protection shall be at least 2' above top of excavation.</p> <p>4b. Use only inspected rigging with 2, 3 or 4 lift points; wear cut-resistant gloves. Rigging to be hooked up to factory installed hook up points on equipment. Control load with non-conductive tag lines with workers out of exclusion zone. Don't stand underneath suspended load; wear steel toed boots and hard hat.</p> <p>4c. Shoring to be set and sides will be backfilled to avoid fall hazards before workers are allowed to enter area. Operator will be in "HANDS OFF" mode before workers enter work area to unhook rigging. An inspected ladder extending 3' above top of the shoring will be used to enter and exit the shoring. Workers will use three points of contact when using the ladder.</p>
5. Secure/Leave Site. If backfilling, see excavation backfilling and compaction JSA for potential hazards and critical actions.	<p><b>5a. FALL:</b> Potential Slip, Trip or Fall - may cause muscle strains or tears, abrasions or lacerations, or broken bones.</p>	<p>5a. See 1c.</p> <p>5a. All open excavations must be backfilled or secured prior to departure with steel plates, orange construction fence or temporary chain link fencing.</p>

<sup>1</sup> Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

<sup>2</sup> A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object;

Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy source - electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

SDSs for Chemicals Used



## SAFETY DATA SHEET

Creation Date 10-Dec-2009

Revision Date 23-Jan-2018

Revision Number 5

### 1. Identification

**Product Name** Tetrachloroethylene

**Cat No. :** AC445690000; ACR445690010; AC445690025; AC445691000

**CAS-No** 127-18-4

**Synonyms** Perchloroethylene

**Recommended Use** Laboratory chemicals.

**Uses advised against** Not for food, drug, pesticide or biocidal product use

#### Details of the supplier of the safety data sheet

##### Company

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

Acros Organics  
One Reagent Lane  
Fair Lawn, NJ 07410

##### **Emergency Telephone Number**

For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11

Emergency Number **US**:001-201-796-7100 / **Europe**: +32 14 57 52 99

**CHEMTREC** Tel. No.**US**:001-800-424-9300 / **Europe**:001-703-527-3887

### 2. Hazard(s) identification

#### **Classification**

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

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

#### Label Elements

##### **Signal Word**

Danger

##### **Hazard Statements**

Causes skin irritation

Causes serious eye irritation

May cause an allergic skin reaction

May cause drowsiness or dizziness

May cause cancer

May cause 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  
Wash face, hands and any exposed skin thoroughly after handling  
Contaminated work clothing should not be allowed out of the workplace  
Do not breathe dust/fume/gas/mist/vapors/spray  
Use only outdoors or in a well-ventilated area  
Wear protective gloves/protective clothing/eye protection/face protection

**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

**Skin**

IF ON SKIN: Wash with plenty of soap and water  
Take off contaminated clothing and wash before reuse  
If skin irritation or rash occurs: Get medical advice/attention

**Eyes**

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing  
If eye irritation persists: Get medical advice/attention

**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)**

Toxic to aquatic life with long lasting effects

**WARNING.** Cancer - <https://www.p65warnings.ca.gov/>.

### 3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>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**

Move 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**

None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

**Notes to Physician**

Treat symptomatically

### 5. Fire-fighting measures

**Suitable Extinguishing Media** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**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**

Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

**Hazardous Combustion Products**

Chlorine Hydrogen chloride gas Phosgene

**Protective Equipment and Precautions for Firefighters**

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**NFPA**

**Health**  
2

**Flammability**  
0

**Instability**  
0

**Physical hazards**  
N/A

### 6. Accidental release measures

**Personal Precautions** Use personal protective equipment. Ensure adequate ventilation.

**Environmental Precautions** Do not flush into surface water or sanitary sewer system.

**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. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.

**Storage** Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

### 8. Exposure controls / personal protection

**Exposure Guidelines**

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m <sup>3</sup> Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm	TWA: 100 ppm TWA: 670 mg/m <sup>3</sup> TWA: 200 ppm TWA: 1250 mg/m <sup>3</sup> STEL: 200 ppm STEL: 1340 mg/m <sup>3</sup>

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or 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.

**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**

Long sleeved clothing.

**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	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Density	1.619
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C <sub>2</sub> Cl <sub>4</sub>
Molecular Weight	165.83

## 10. Stability and reactivity

<b>Reactive Hazard</b>	None known, based on information available
<b>Stability</b>	Stable under normal conditions.
<b>Conditions to Avoid</b>	Incompatible products. Excess heat. Exposure to moist air or water.
<b>Incompatible Materials</b>	Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines, Aluminium
<b>Hazardous Decomposition Products</b>	Chlorine, Hydrogen chloride gas, Phosgene
<b>Hazardous Polymerization</b>	Hazardous polymerization does not occur.
<b>Hazardous Reactions</b>	None under normal processing.

## 11. Toxicological information

### Acute Toxicity

#### Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg ( Rat )	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 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** Irritating to eyes and skin

**Sensitization** No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

*IARC: (International Agency for Research on Cancer)*

*NTP: (National Toxicity Program)*

*ACGIH: (American Conference of Governmental Industrial Hygienists)*

*Mexico - Occupational Exposure Limits - Carcinogens*

*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)*

*Known - Known Carcinogen*

*Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*

*A1 - Known Human Carcinogen*

*A2 - Suspected Human Carcinogen*

*A3 - Animal Carcinogen*

*ACGIH: (American Conference of Governmental Industrial Hygienists)*

*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** Central nervous system (CNS)

**STOT - repeated exposure** Kidney Liver Blood

**Aspiration hazard** No information available

**Symptoms / effects, both acute and delayed** Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

#### Endocrine Disruptor Information

Component	EU - Endocrine Disruptors Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

**Other Adverse Effects** Tumorigenic effects have been reported in experimental animals.

## 12. Ecological information

#### Ecotoxicity

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
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

**Persistence and Degradability** Insoluble in water Persistence is unlikely based on information available.

**Bioaccumulation/ Accumulation** No information available.

**Mobility** . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.53 - 2.88

## 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
Tetrachloroethylene - 127-18-4	U210	-

## 14. Transport information

#### DOT

UN-No UN1897  
 Proper Shipping Name TETRACHLOROETHYLENE  
 Hazard Class 6.1  
 Packing Group III

#### TDG

UN-No UN1897

Proper Shipping Name TETRACHLOROETHYLENE  
 Hazard Class 6.1  
 Packing Group III

**IATA**

UN-No UN1897  
 Proper Shipping Name TETRACHLOROETHYLENE  
 Hazard Class 6.1  
 Packing Group III

**IMDG/IMO**

UN-No UN1897  
 Proper Shipping Name TETRACHLOROETHYLENE  
 Hazard Class 6.1  
 Subsidiary Hazard Class P  
 Packing Group III

## 15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

**International Inventories**

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		X	X	X	X	X

**Legend:**

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

**U.S. Federal Regulations**

TSCA 12(b) Not applicable

**SARA 313**

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	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
Tetrachloroethylene	-	-	X	X

**Clean Air Act**

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

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
Tetrachloroethylene	100 lb 1 lb	-

**California Proposition 65** This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

**U.S. State Right-to-Know Regulations**

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

**U.S. Department of Transportation**

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

**U.S. Department of Homeland Security**

This product does not contain any DHS chemicals.

**Other International Regulations**

**Mexico - Grade** No information available

**16. Other information**

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

**Creation Date** 10-Dec-2009

**Revision Date** 23-Jan-2018

**Print Date** 23-Jan-2018

**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

**Disclaimer**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

**End of SDS**

# SAFETY DATA SHEET

Creation Date 03-Feb-2010

Revision Date 14-Jul-2016

Revision Number 2

## 1. Identification

**Product Name** Trichloroethylene

**Cat No. :** T340-4; T341-4; T341-20; T341-500; T403-4

**Synonyms** Trichloroethene (Stabilized/Technical/Electronic/Certified ACS)

**Recommended Use** Laboratory chemicals.

**Uses advised against**

### Details of the supplier of the safety data sheet

**Company**

Fisher Scientific  
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)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, spleen, Blood.	

**Label Elements****Signal Word**

Danger

**Hazard Statements**

Causes skin irritation  
Causes serious eye irritation  
May cause an allergic skin reaction  
May cause drowsiness or dizziness  
Suspected of causing genetic defects  
May cause cancer  
May cause 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  
Wash face, hands and any exposed skin thoroughly after handling  
Contaminated work clothing should not be allowed out of the workplace  
Do not breathe dust/fume/gas/mist/vapors/spray  
Use only outdoors or in a well-ventilated area  
Wear protective gloves/protective clothing/eye protection/face protection

**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

**Skin**

IF ON SKIN: Wash with plenty of soap and water  
Take off contaminated clothing and wash before reuse  
If skin irritation or rash occurs: Get medical advice/attention

**Eyes**

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing  
If eye irritation persists: Get medical advice/attention

**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)**

Harmful to aquatic life with long lasting effects

WARNING! This product contains a chemical known in the State of California to cause cancer, birth defects or other reproductive harm.

### 3. Composition / information on ingredients

Component	CAS-No	Weight %
Trichloroethylene	79-01-6	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**

Move 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/effects** None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

**Notes to Physician** Treat symptomatically

## 5. Fire-fighting measures

**Suitable Extinguishing Media** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Unsuitable Extinguishing Media** No information available

**Flash Point** No information available  
**Method -** No information available

**Autoignition Temperature** 410 °C / 770 °F

### Explosion Limits

**Upper** 10.5 vol %

**Lower** 8 vol %

**Oxidizing Properties** Not oxidising

**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. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

### Hazardous Combustion Products

Hydrogen chloride gas Chlorine Phosgene Carbon monoxide (CO) Carbon dioxide (CO<sub>2</sub>)

### 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**  
2

**Flammability**  
1

**Instability**  
0

**Physical hazards**  
N/A

## 6. Accidental release measures

**Personal Precautions** Ensure adequate ventilation. Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

**Environmental Precautions** Should not be released into the environment. Do not flush into surface water or sanitary sewer system.

**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. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe vapors or spray mist. Do not ingest.

**Storage** Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from light. Do not store in aluminum containers.

## 8. Exposure controls / personal protection

### Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Trichloroethylene	TWA: 10 ppm STEL: 25 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 270 mg/m <sup>3</sup> Ceiling: 200 ppm (Vacated) STEL: 200 ppm (Vacated) STEL: 1080 mg/m <sup>3</sup> TWA: 100 ppm	IDLH: 1000 ppm	TWA: 100 ppm TWA: 535 mg/m <sup>3</sup> STEL: 200 ppm STEL: 1080 mg/m <sup>3</sup>

### Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or 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.

### 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

Long sleeved clothing.

#### 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	Liquid
Appearance	Colorless
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-85 °C / -121 °F
Boiling Point/Range	87 °C / 188.6 °F
Flash Point	No information available
Evaporation Rate	0.69 (Carbon Tetrachloride = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	10.5 vol %
Lower	8 vol %
Vapor Pressure	77.3 mbar @ 20 °C
Vapor Density	4.5 (Air = 1.0)
Specific Gravity	1.460
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	410 °C / 770 °F
Decomposition Temperature	> 120°C
Viscosity	0.55 mPa.s (25°C)

Molecular Formula  
Molecular Weight

C<sub>2</sub> H Cl<sub>3</sub>  
131.39

## 10. Stability and reactivity

<b>Reactive Hazard</b>	None known, based on information available
<b>Stability</b>	Light sensitive.
<b>Conditions to Avoid</b>	Incompatible products. Excess heat. Exposure to light. Exposure to moist air or water.
<b>Incompatible Materials</b>	Strong oxidizing agents, Strong bases, Amines, Alkali metals, Metals,
<b>Hazardous Decomposition Products</b>	Hydrogen chloride gas, Chlorine, Phosgene, Carbon monoxide (CO), Carbon dioxide (CO <sub>2</sub> )
<b>Hazardous Polymerization</b>	Hazardous polymerization does not occur.
<b>Hazardous Reactions</b>	None under normal processing.

## 11. Toxicological information

### Acute Toxicity

#### Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Trichloroethylene	LD50 = 4290 mg/kg ( Rat ) LD50 = 4920 mg/kg ( Rat )	LD50 > 20 g/kg ( Rabbit ) LD50 = 29000 mg/kg ( Rabbit )	LC50 = 26 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** Irritating to eyes and skin

**Sensitization** No information available

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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Trichloroethylene	79-01-6	Group 1	Reasonably Anticipated	A2	X	Not listed

*IARC: (International Agency for Research on Cancer)*

*NTP: (National Toxicity Program)*

*ACGIH: (American Conference of Governmental Industrial Hygienists)*

*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)*

*Known - Known Carcinogen*

*Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*

*A1 - Known Human Carcinogen*

*A2 - Suspected Human Carcinogen*

*A3 - Animal Carcinogen*

*ACGIH: (American Conference of Governmental Industrial Hygienists)*

**Mutagenic Effects** Mutagenic effects have occurred in humans.

**Reproductive Effects** No information available.

**Developmental Effects** No information available.

**Teratogenicity** No information available.

<b>STOT - single exposure</b>	Central nervous system (CNS)
<b>STOT - repeated exposure</b>	Kidney Liver Heart spleen Blood
<b>Aspiration hazard</b>	No information available
<b>Symptoms / effects, both acute and delayed</b>	Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
<b>Endocrine Disruptor Information</b>	No information available
<b>Other Adverse Effects</b>	The toxicological properties have not been fully investigated.

## 12. Ecological information

### Ecotoxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. The product contains following substances which are hazardous for the environment. Contains a substance which is: Harmful to aquatic organisms. Toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Trichloroethylene	EC50: = 175 mg/L, 96h (Pseudokirchneriella subcapitata) EC50: = 450 mg/L, 96h (Desmodesmus subspicatus)	LC50: 39 - 54 mg/L, 96h static (Lepomis macrochirus) LC50: 31.4 - 71.8 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 0.81 mg/L 24 h EC50 = 115 mg/L 10 min EC50 = 190 mg/L 15 min EC50 = 235 mg/L 24 h EC50 = 410 mg/L 24 h EC50 = 975 mg/L 5 min	EC50: = 2.2 mg/L, 48h (Daphnia magna)

**Persistence and Degradability** Persistence is unlikely based on information available.

**Bioaccumulation/ Accumulation** No information available.

**Mobility** Will likely be mobile in the environment due to its volatility.

Component	log Pow
Trichloroethylene	2.4

## 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
Trichloroethylene - 79-01-6	U228	-

## 14. Transport information

### DOT

<b>UN-No</b>	UN1710
<b>Proper Shipping Name</b>	TRICHLOROETHYLENE
<b>Hazard Class</b>	6.1
<b>Packing Group</b>	III

### TDG

<b>UN-No</b>	UN1710
<b>Proper Shipping Name</b>	TRICHLOROETHYLENE
<b>Hazard Class</b>	6.1
<b>Packing Group</b>	III

### IATA

<b>UN-No</b>	UN1710
<b>Proper Shipping Name</b>	TRICHLOROETHYLENE

Hazard Class	6.1
Packing Group	III
<b>IMDG/IMO</b>	
UN-No	UN1710
Proper Shipping Name	TRICHLOROETHYLENE
Hazard Class	6.1
Packing Group	III

### 15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

#### International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Trichloroethylene	X	X	-	201-167-4	-		X	X	X	X	X

#### Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

#### U.S. Federal Regulations

TSCA 12(b) Not applicable

Component	TSCA 12(b)
Trichloroethylene	Section 5

#### SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Trichloroethylene	79-01-6	100	0.1

#### SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

#### CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Trichloroethylene	X	100 lb	X	X

#### Clean Air Act

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

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
Trichloroethylene	100 lb 1 lb	-

**California Proposition 65** This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Trichloroethylene	79-01-6	Carcinogen Developmental Male Reproductive	14 µg/day 50 µg/day	Developmental Carcinogen

**U.S. State Right-to-Know Regulations**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trichloroethylene	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

**16. Other information**

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

**Creation Date** 03-Feb-2010

**Revision Date** 14-Jul-2016

**Print Date** 14-Jul-2016

**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

acc. to OSHA HCS

Printing date 03/05/2019

Reviewed on 03/05/2019

## 1 Identification

- **Product identifier**
- **Product Name:** BTEX Standard
- **Part Number:** BTEX
- **Application of the substance / the mixture** Certified Reference Material
- **Details of the supplier of the safety data sheet**
- **Manufacturer/Supplier:**  
SPEX CertiPrep, LLC.  
203 Norcross Ave, Metuchen,  
NJ 08840 USA
- **Information department:** product safety department
- **Emergency telephone number:**  
Emergency Phone Number (24 hours)  
CHEMTREC (800-424-9300)  
Outside US: 703-527-3887

## 2 Hazard(s) identification

- **Classification of the substance or mixture**



GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.



GHS06 Skull and crossbones

Acute Tox. 3 H331 Toxic if inhaled.



GHS08 Health hazard

STOT SE 1 H370 Causes damage to organs.

- **Label elements**
- **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).
- **Hazard pictograms**



GHS02



GHS06



GHS08

- **Signal word** Danger
- **Hazard-determining components of labeling:**  
methanol
- **Hazard statements**  
H225 Highly flammable liquid and vapor.  
H331 Toxic if inhaled.  
H370 Causes damage to organs.
- **Precautionary statements**  
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
Use explosion-proof electrical/ventilating/lighting/equipment.  
Do not breathe dust/fume/gas/mist/vapors/spray.  
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.  
Store locked up.  
Dispose of contents/container in accordance with local/regional/national/international regulations.
- **Classification system:**
- **NFPA ratings (scale 0 - 4)**



Health = 1

Fire = 3

Reactivity = 0

(Contd. on page 2)



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Product Name: BTEX Standard

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## · HMIS-ratings (scale 0 - 4)

HEALTH 1

Health = \*1

FIRE 3

Fire = 3

REACTIVITY 0

Reactivity = 0

## · Other hazards

## · Results of PBT and vPvB assessment

· PBT: Not applicable.

· vPvB: Not applicable.

## 3 Composition/information on ingredients

### · Chemical characterization: Mixtures

· Description: Mixture of the substances listed below with nonhazardous additions.

### · Dangerous components:

67-56-1	methanol	99.88%
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### · Chemical identification of the substance/preparation

71-43-2	benzene	0.02%
95-47-6	o-xylene	0.02%
106-42-3	p-xylene	0.02%
108-88-3	toluene	0.02%
100-41-4	ethylbenzene	0.02%
108-38-3	m-xylene	0.02%

## 4 First-aid measures

### · Description of first aid measures

### · General information:

Immediately remove any clothing soiled by the product.

Remove breathing apparatus only after contaminated clothing have been completely removed.

In case of irregular breathing or respiratory arrest provide artificial respiration.

### · After inhalation:

Supply fresh air or oxygen; call for doctor.

In case of unconsciousness place patient stably in side position for transportation.

### · After skin contact: Immediately wash with water and soap and rinse thoroughly.

### · After eye contact: Rinse opened eye for several minutes under running water. Then consult a doctor.

### · After swallowing: Do not give anything to eat or drink - Do not induce vomiting

### · Information for Doctor:

· Most important symptoms and effects, both acute and delayed No further relevant information available.

· Indication of any immediate medical attention and special treatment needed No further relevant information available.

## 5 Fire-fighting measures

### · Extinguishing media

· Suitable extinguishing agents: CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

· Special hazards arising from the substance or mixture During heating or in case of fire poisonous gases are produced.

### · Advice for firefighters

· Protective equipment: Mouth respiratory protective device.

## 6 Accidental release measures

### · Personal precautions, protective equipment and emergency procedures

Mount respiratory protective device.

Wear protective equipment. Keep unprotected persons away.

### · Environmental precautions:

Dilute with plenty of water.

Do not allow to enter sewers/ surface or ground water.

### · Methods and material for containment and cleaning up:

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

Dispose contaminated material as waste according to item 13.

Ensure adequate ventilation.

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· **Reference to other sections**

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

· **Protective Action Criteria for Chemicals**· **PAC-1:**

67-56-1	methanol	530 ppm
71-43-2	benzene	52 ppm
108-88-3	toluene	67 ppm
100-41-4	ethylbenzene	33 ppm
108-38-3	m-xylene	130 ppm

· **PAC-2:**

67-56-1	methanol	2,100 ppm
71-43-2	benzene	800 ppm
108-88-3	toluene	560 ppm
100-41-4	ethylbenzene	1100* ppm
108-38-3	m-xylene	920 ppm

· **PAC-3:**

67-56-1	methanol	7200* ppm
71-43-2	benzene	4000* ppm
108-88-3	toluene	3700* ppm
100-41-4	ethylbenzene	1800* ppm
108-38-3	m-xylene	2500* ppm

**7 Handling and storage**· **Handling:**· **Precautions for safe handling**

Ensure good ventilation/exhaustion at the workplace.

Open and handle receptacle with care.

Prevent formation of aerosols.

· **Information about protection against explosions and fires:**

Keep ignition sources away - Do not smoke.

Protect against electrostatic charges.

Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**· **Storage:**· **Requirements to be met by storerooms and receptacles:** Store in a cool location.· **Information about storage in one common storage facility:** Not required.· **Further information about storage conditions:**

Keep receptacle tightly sealed.

Store in cool, dry conditions in well sealed receptacles.

· **Specific end use(s)** No further relevant information available.**8 Exposure controls/personal protection**· **Additional information about design of technical systems:** No further data; see item 7.· **Control parameters**· **Components with limit values that require monitoring at the workplace:**

<b>67-56-1 methanol</b>	
PEL	Long-term value: 260 mg/m <sup>3</sup> , 200 ppm
REL	Short-term value: 325 mg/m <sup>3</sup> , 250 ppm
	Long-term value: 260 mg/m <sup>3</sup> , 200 ppm
	Skin
TLV	Short-term value: 328 mg/m <sup>3</sup> , 250 ppm
	Long-term value: 262 mg/m <sup>3</sup> , 200 ppm
	Skin; BEI

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Product Name: BTEX Standard

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### · Ingredients with biological limit values:

#### 67-56-1 methanol

BEI 15 mg/L

Medium: urine

Time: end of shift

Parameter: Methanol (background, nonspecific)

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**

· **Personal protective equipment:**

· **General protective and hygienic measures:**

Keep away from foodstuffs, beverages and feed.

Immediately remove all soiled and contaminated clothing.

Wash hands before breaks and at the end of work.

Store protective clothing separately.

· **Respiratory protection:**

In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.

· **Protection of hands:**



Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.

Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.

Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

· **Material of gloves**

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

· **Penetration time of glove material**

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· **Eye protection:**



Tightly sealed goggles

## 9 Physical and chemical properties

### · Information on basic physical and chemical properties

#### · General Information

#### · Appearance:

Form: Liquid

Color: According to product specification

· **Odor:** Characteristic

· **Odour Threshold:** Not applicable.

· **pH-value:** Not applicable.

#### · Change in condition

Melting point/Melting range: Undetermined.

Boiling point/Boiling range: 64.7 °C (148.5 °F)

· **Flash point:** < 23 °C (<73.4 °F)

· **Flammability (solid, gaseous):** Not applicable.

· **Ignition temperature:** 455 °C (851 °F)

· **Decomposition temperature:** Not applicable.

· **Auto igniting:** Product is not selfigniting.

· **Danger of explosion:** Product is not explosive. However, formation of explosive air/vapor mixtures are possible.

#### · Explosion limits:

Lower: 5.5 Vol %

Upper: 44 Vol %

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· <b>Vapor pressure at 20 °C (68 °F):</b>	128 hPa (96 mm Hg)
· <b>Density at 20 °C (68 °F)</b>	0.79009 g/cm <sup>3</sup> (6.5933 lbs/gal)
· <b>Relative density</b>	Not applicable.
· <b>Vapor density</b>	Not applicable.
· <b>Evaporation rate</b>	Not applicable.
· <b>Solubility in / Miscibility with Water:</b>	Fully miscible.
· <b>Partition coefficient (n-octanol/water):</b>	Not applicable.
· <b>Viscosity:</b>	
<b>Dynamic:</b>	Not applicable.
<b>Kinematic:</b>	Not applicable.
· <b>Solvent content:</b>	
<b>Organic solvents:</b>	100.0 %
<b>VOC content:</b>	100.00 %
· <b>Solids content:</b>	0.0 %
· <b>Other information</b>	No further relevant information available.

**10 Stability and reactivity**

- **Reactivity** No further relevant information available.
- **Chemical stability**
- **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** No further relevant information available.
- **Hazardous decomposition products:** No dangerous decomposition products known.

**11 Toxicological information**

- **Information on toxicological effects**
- **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

**67-56-1 methanol**

Oral	LD50	5,628 mg/kg (rat)
Dermal	LD50	15,800 mg/kg (rabbit)

- **Primary irritant effect:**
- **on the eye:** No irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:  
Toxic

- **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

71-43-2	benzene	I
95-47-6	o-xylene	3
106-42-3	p-xylene	3
108-88-3	toluene	3
100-41-4	ethylbenzene	2B
108-38-3	m-xylene	3

· **NTP (National Toxicology Program)**

71-43-2	benzene	K
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· **OSHA-Ca (Occupational Safety & Health Administration)**

71-43-2	benzene	
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US

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### 12 Ecological information

- **Toxicity**
- **Aquatic toxicity:** No further relevant information available.
- **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
- **Bioaccumulative potential** No further relevant information available.
- **Mobility in soil** No further relevant information available.
- **Additional ecological information:**
- **General notes:**  
Water hazard class 1 (Self-assessment): slightly hazardous for water  
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

### 13 Disposal considerations

- **Waste treatment methods**
- **Recommendation:** Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
- **Uncleaned packagings:**
- **Recommendation:** Disposal must be made according to official regulations.
- **Recommended cleansing agent:** Water, if necessary with cleansing agents.

### 14 Transport information

- |   |                     |
|---|---------------------|
| · <b>UN-Number</b>  | UN1230              |
| · <b>DOT, ADR, IMDG, IATA</b>   |                     |
| · <b>UN proper shipping name</b>  | Methanol            |
| · <b>DOT</b>  | 1230 METHANOL       |
| · <b>ADR</b>  | METHANOL            |
| · <b>IMDG, IATA</b>   |                     |
| · <b>Transport hazard class(es)</b>   |                     |
| · <b>DOT</b>  |                     |
|   |                     |
| · <b>Class</b>  | 3 Flammable liquids |
| · <b>Label</b>  | 3, 6.1              |
| · <b>ADR</b>  |                     |
|   |                     |
| · <b>Class</b>  | 3 Flammable liquids |
| · <b>Label</b>  | 3+6.1               |
| · <b>IMDG</b>   |                     |
|   |                     |
| · <b>Class</b>  | 3 Flammable liquids |

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Product Name: BTEX Standard

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· Label	3/6.1
· IATA	
 	
· Class	3 Flammable liquids
· Label	3 (6.1)
· Packing group	
· DOT, ADR, IMDG, IATA	II
· Environmental hazards:	Not applicable.
· Special precautions for user	Warning: Flammable liquids
· Danger code (Kemler):	336
· EMS Number:	F-E,S-D
· Stowage Category	B
· Stowage Code	SW2 Clear of living quarters.
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
· Transport/Additional information:	
· ADR	
· Excepted quantities (EQ)	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· IMDG	
· Limited quantities (LQ)	1L
· Excepted quantities (EQ)	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· UN "Model Regulation":	UN 1230 METHANOL, 3 (6.1), II

## 15 Regulatory information

· Safety, health and environmental regulations/legislation specific for the substance or mixture	
· Sara	
· Section 313 (Specific toxic chemical listings):	
All ingredients are listed.	
· TSCA (Toxic Substances Control Act):	
All ingredients are listed.	
· Proposition 65	
· Chemicals known to cause cancer:	
71-43-2 benzene	
100-41-4 ethylbenzene	
· Chemicals known to cause reproductive toxicity for females:	
None of the ingredients is listed.	
· Chemicals known to cause reproductive toxicity for males:	
71-43-2 benzene	
· Chemicals known to cause developmental toxicity:	
67-56-1 methanol	
71-43-2 benzene	
108-88-3 toluene	
· Carcinogenic categories	
· EPA (Environmental Protection Agency)	
71-43-2 benzene	A, K/L
95-47-6 o-xylene	I
106-42-3 p-xylene	I
108-88-3 toluene	II

(Contd. on page 8)

# Safety Data Sheet

## acc. to OSHA HCS

Printing date 03/05/2019

Reviewed on 03/05/2019

**Product Name: BTEX Standard**

(Contd. of page 7)

100-41-4	ethylbenzene	D
108-38-3	m-xylene	I

· **TLV (Threshold Limit Value established by ACGIH)**

71-43-2	benzene	A1
95-47-6	o-xylene	A4
106-42-3	p-xylene	A4
108-88-3	toluene	A4
100-41-4	ethylbenzene	A3
108-38-3	m-xylene	A4

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

71-43-2	benzene
---------	---------

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**



· **Signal word** Danger

· **Hazard-determining components of labeling:**

methanol

· **Hazard statements**

H225 Highly flammable liquid and vapor.

H331 Toxic if inhaled.

H370 Causes damage to organs.

· **Precautionary statements**

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Use explosion-proof electrical/ventilating/lighting/equipment.

Do not breathe dust/fume/gas/mist/vapors/spray.

If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

Store locked up.

Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

## 16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** product safety department

· **Contact:**

SPEX CertiPrep, LLC.

1-732-549-7144

· **Date of preparation / last revision** 03/05/2019 / -

· **Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

ACGIH: American Conference of Governmental Industrial Hygienists

EINECS: European Inventory of Existing Commercial Chemical Substances

ELINCS: European List of Notified Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

VOC: Volatile Organic Compounds (USA, EU)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

PBT: Persistent, Bioaccumulative and Toxic

vPvB: very Persistent and very Bioaccumulative

NIOSH: National Institute for Occupational Safety

OSHA: Occupational Safety & Health

TLV: Threshold Limit Value

PEL: Permissible Exposure Limit

REL: Recommended Exposure Limit

BEI: Biological Exposure Limit

Flam. Liq. 2: Flammable liquids – Category 2

Acute Tox. 3: Acute toxicity – Category 3

STOT SE 1: Specific target organ toxicity (single exposure) – Category 1

Personal Protective Equipment (PPE) Management Program



## **PERSONAL PROTECTIVE EQUIPMENT MANAGEMENT PROGRAM**

**CORPORATE HEALTH AND SAFETY MANAGER** : **Brian Hobbs, CIH, CSP**  
**EFFECTIVE DATE** : **01/19**  
**REVISION NUMBER** : **4**

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## **1. PURPOSE**

Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, "Roux") has instituted the following program to establish guidelines for the selection of personal protective equipment (PPE) for use by Roux personnel performing field activities in hazardous environments. PPE is not meant to be a substitute for engineering, work practice, and/or administrative controls, but PPE should be used in conjunction with these controls to protect the employees in the work place. Clothing, body coverings, and other accessories designed to prevent worker exposure to workplace hazards are all types of PPE. To ensure adequate PPE employee-owned PPE is evaluated on a case-by-case basis to insure its adequacy, maintenance and sanitation.

## **2. SCOPE AND APPLICABILITY**

These guidelines apply to all PPE selection decisions to be made in implementing the Roux program. The foundations for this program are the numerous Occupational Health and Safety Administration (OSHA) standards related to PPE cited in 29 CFR 1910 Subpart I, 29 CFR 1926 Subpart E, and the hazardous environment work employee protection requirements under the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 and 1926.65. To ensure hazard assessments are documented the levels of protection, types of protection and tasks requiring protection are covered in site-specific Health and Safety Plans (HASPs) and Job Safety Analyses (JSAs).

## **3. PROCEDURES**

Due to the varied nature of site activities and the different potential hazards associated with different sites, several aspects must be considered when selecting PPE. The following text describes PPE selection logic and provides guidelines and requirements for the appropriate selection and use of PPE.

### **3.1 Introduction**

To harm the body, chemicals must first gain entrance. The intact skin and the respiratory tract are usually the first body tissues attacked by chemical contaminants. These tissues provide barriers to some chemicals but in many cases, are damaged themselves or are highly permeable by certain chemical compounds. Personal protective equipment therefore is used to minimize or eliminate chemical compounds coming into contact with these first barrier tissues.

The proper selection of equipment is important in preventing exposures. The PM making the selection will have to take several factors into consideration. The level of protection, type and kind of equipment selected depends on the hazardous conditions and in some cases cost, availability, compatibility with other equipment, and performance. An accurate assessment of all these factors must be made before work can be safely carried out.

### **3.2 Types of PPE**

The type and selection of PPE must meet certain general criteria and requirements as required under OSHA 29 CFR 1910.132 and 1926.95. In addition to these general requirements, specific requirements and specifications exist for some types of PPE that form the basis of the protective clothing scheme. Following is a list of the common types of specific PPE and the specific requirements for the PPE type, where applicable:

1. Hard Hats - Regulated by 29 CFR 1910.135 and 1926.100; and, specified in ANSI Z89.1.

2. Face Shields and Safety Glasses - Regulated by 29 CFR 1910.133 and 1926.102; and, specified in ANSI Z87.1.
3. Respiratory Protection - Regulated by 29 CFR 1910.134 and 1926.103.
4. Hand Protection - Not specifically regulated.
5. Foot Protection - Regulated by 29 CFR 1910.136 and 1926.96; and, specified in ANSI Z41.1.
6. Protective Clothing (e.g., fully encapsulated suits, aprons) - Not specifically regulated.

### **3.3 Protective Clothing Selection Criteria**

#### **3.3.1 Chemicals Present**

The most important factor in selecting PPE is the determination of what chemicals the employee may be exposed to. On field investigations, the number of chemicals may range from a few to several hundred. The exact chemicals or group of chemicals present at the site (certain groups tend to require similar protection) can be determined by collecting and analyzing samples of the air, soil, water, or other site media. When data are lacking, research into the materials used or stored at the site can be used to infer chemicals possibly on the site.

Once the known or suspected chemicals have been identified, and taking into consideration the type of work to be performed, the most appropriate clothing shall be selected.

Protective garments are made of several different substances for protection against specific chemicals. There is no universal protective material. All will decompose, be permeated by, or otherwise fail to protect under given circumstances. Fortunately, most manufacturers make guides to the use of their products (i.e., Dupont's Tyvek™ Permeation Guide). These guides are usually for gloves and coveralls and typically provide information regarding chemical degradation rates (failure of the material to maintain structural integrity when in contact with the chemical), and may provide information on the permeation rate (whether or not the material allows the chemical to pass through). When permeation tables are available, they shall be used in conjunction with degradation tables to determine the most appropriate protective material.

During most site work, chemicals are usually in mixed combinations and the protective materials are not in continuous contact with pure chemicals for long periods of time; therefore, the selected material may be adequate for the particular chemical and type of work being performed, yet not the "best" protecting material for all site chemicals and activities. Selection shall depend upon the most hazardous chemicals based on their hazards and concentrations. Sometimes layering, using several different layers of protective materials, affords the best protection.

#### **3.3.2 Concentration of the Chemical(s)**

One of the major criteria for selecting protective material is the concentration of the chemical(s) in air, liquid, and/or solid state. Airborne and liquid chemical concentrations should be compared to the OSHA standards and/or American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) guidelines to determine the level of skin or other absorptive surface (e.g., eyes) protection needed. While these standards are not designed specifically for skin exposed directly to the liquid, they may provide skin designations indicative of chemicals known to have significant skin or dermal absorption effects. For example, airborne levels of PCB on-site may be

low because it is not very volatile, so the inhalation hazard may be minimal; however, PCB-containing liquid coming in direct contact with the skin may cause overexposure. Thus, PCB has been assigned a skin designation in both the OSHA and ACGIH exposure limit tables.

### **3.3.3 Physical State**

The characteristics of a chemical may range from nontoxic to extremely toxic depending on its physical state. Inorganic lead in soil would not be considered toxic to site personnel, unless it became airborne, since it is generally not absorbed through the intact skin. Organic lead in a liquid could be readily absorbed. Soil is frequently contaminated with hazardous materials. Concentrations will vary from a few parts per million to nearly one hundred percent. The degree of hazard is dependent on the type of soil and concentration of the chemical. Generally speaking, "dry" soils do not cause a hazard to site personnel if they take minimal precautions such as wearing some type of lightweight gloves.

### **3.3.4 Length of Exposure**

The length of time a material is exposed to a chemical increases the probability of breakthrough. Determinations of actual breakthrough times for short-term exposures indicate that several different materials can be used which would be considered inadequate under long-term exposures. It should be kept in mind that during testing, a pure (100% composition) liquid is usually placed in direct contact with the material producing a worst-case situation.

### **3.3.5 Abrasion**

When selecting protective clothing, the job the employee is engaged in must be taken into consideration. Persons moving drums or performing other manual tasks may require added protection for their hands, lower chest and thighs. The use of leather gloves and a heavy apron over the other normal protective clothing will help prevent damage to the normal PPE and thus reduce worker exposures.

### **3.3.6 Dexterity**

Although protection from skin and inhalation hazards is the primary concern when selecting PPE, the ability to perform the assigned task must be maintained. For example, personnel cannot be expected to perform work that requires fine dexterity if they must wear a thick glove. Therefore, the PPE selection process must consider the task being performed and provide PPE alternatives or techniques that allow dexterity to be maintained while still protecting the worker (e.g., wearing tight latex gloves over more bulky hand protection to increase dexterity).

### **3.3.7 Ability to Decontaminate**

If disposable clothing cannot be used, the ability to decontaminate the materials selected must be taken into consideration. Once a chemical contacts the material, it must be cleaned before it can be reused. If the chemical has completely permeated the material, it is unlikely that the clothing can be adequately decontaminated and the material should be discarded.

### **3.3.8 Climactic Conditions**

The human body works best with few restraints from clothing. Protective clothing adds a burden by adding weight and restricting movement as well as preventing the natural cooling process. In severe situations, a modified work program must be used.

Some materials act differently when they are very hot and very cold. For example, PVC becomes almost brittle in very cold temperatures. If there are any questions about the stability of the protective materials under different conditions, the manufacturer should be contacted.

### **3.3.9 Work Load**

Like climactic conditions, the type of work activity may affect work duration and the ability of personnel to perform certain tasks. Similarly, the amount of protective materials a person wears will affect their ability to perform certain tasks. For example, a person in a total encapsulating suit, even at 72 °F, cannot work for more than a short period of time without requiring a break.

The work schedule should be adjusted to maintain the health of the employees. Special consideration should be given to the selection of clothing that both protects and adds the least burden when personnel are required to perform strenuous tasks. Excessive bodily stress frequently represents the most significant hazard encountered during field work.

### **3.4 Types of Protective Materials**

1. Cellulose or Paper
2. Natural and Synthetic Fibers
  - a. Tyvek™
  - b. Nomex™
3. Elastomers
  - a. Polyethylene
  - b. Saran
  - c. Polyvinyl Chloride (PVC)
  - d. Neoprene
  - e. Butyl Rubber
  - f. Viton

### **3.5 Protection Levels**

#### **3.5.1 Level A Protection**

Level A protection (a fully encapsulated suit) is used when skin hazards exist or when there is no known data that positively rule out skin and other absorption hazards. Since Level A protection is extremely physiologically and psychologically stressful, the decision to use this protection must be carefully considered. At no time will Level A work be performed without the consent of the OM. The following conditions suggest a need for Level A protection:

- confined facilities where probability of skin contact is high;
- sites containing known skin hazards;
- sites with no established history to rule out skin and other absorption hazards;
- atmosphere immediately dangerous to life and health (IDLH) through the skin absorption route;
- site exhibiting signs of acute mammalian toxicity (e.g., dead animals, illnesses associated with past entry into site by humans);

- sites at which sealed drums of unknown materials must be opened;
- total atmospheric readings on the Photoionization Detector (PID), Flame Ionization Detector (FID), and similar instruments indicate 500 to 1,000 ppm of unidentified substances; and
- extremely hazardous substances (e.g., cyanide compounds, concentrated pesticides, Department of Transportation Poison "A" materials, suspected carcinogens and infectious substances) are known or suspected to be present and skin contact is possible.

The following items constitute Level A protection:

- open circuit, pressure-demand self-contained breathing apparatus (SCBA);
- totally encapsulated suit;
- gloves, inner (surgical type);
- gloves, outer;
- chemical protective;
- boots, chemical protective, steel toe and shank;
- radiation detector (if applicable); and
- communications.

### **3.5.2 Level B Protection**

Level B protection is utilized when the highest level of respiratory protection is needed but hazardous material exposure to the few unprotected areas of the body is unlikely.

The following conditions suggest a need for Level B protection:

- the type and atmospheric concentration of toxic substances have been identified and they require the highest level of respiratory protection;
- IDLH atmospheres where the substance or concentration in the air does not present a severe skin hazard;
- the type and concentrations of toxic substances do not meet the selection criteria permitting the use of air purifying respirators; and
- it is highly unlikely that the work being done will generate high concentrations of vapors, gases or particulates, or splashes of materials that will affect the skin of personnel.

Personal protective equipment for Level B includes:

- open circuit, pressure-demand SCBA;
- chemical protective clothing:
- overalls and long-sleeve jacket; or
- coveralls;
- gloves, inner (surgical type); gloves, outer, chemical protective;
- boots, chemical protective, steel toe and shank; and
- communications optional.

### **3.5.3 Level C Protection**

Level C protection is utilized when both skin and respiratory hazards are well defined and the criteria for the use of negative pressure respirators have been fulfilled (i.e., known contaminants and contaminant concentrations, acceptable oxygen levels, approved filter/cartridge available, known cartridge service life, etc.). Level C protection may require carrying an emergency escape respirator during certain initial entry and site reconnaissance situations, or when applicable thereafter.

Personal protective equipment for Level C typically includes:

- full facepiece air-purifying respirator;
- emergency escape respirator (optional);
- chemical protective clothing:
  - overalls and long-sleeved jacket; or
  - coveralls;
- gloves, inner (surgical type);
- gloves, outer, chemical protective; and
- boots, chemical protective, steel toe and shank.

### **3.5.4 Level D Protection**

Level D is the basic work uniform. Personal protective equipment for Level D includes:

- coveralls;
- safety boots/shoes;
- eye protection;
- hand protection;
- reflective traffic safety vest (mandatory for traffic areas or railyard);
- hard hat (with face shield is optional); and
- emergency escape respirator is optional.

### **3.5.5 Level E Protection**

Level E protection is used when radioactivity above 10 mr/hr is detected at the site. Personal protective equipment for Level E includes:

- coveralls;
- air purifying respirator;
- time limits on exposure;
- appropriate dermal protection for the type of radiation present; and
- radiation dosage monitoring.



### 3.5.6 Additional Considerations

Field work will contain a variety of situations due to chemicals in various concentrations and combinations. These situations may be partially ameliorated by following the work practices listed below:

1. Some sort of foot protection is needed on a site. If the ground to be worked on is contaminated with liquid and it is necessary to walk in the chemicals, some sort of protective "booties" can be worn over the boots. This cuts down on decontamination requirements. They are designed with soles to help prevent them from slipping around. If non-liquids are to be encountered, a Tyvek™ bootie could be used. If the ground contains any sharp objects, the advantage of booties is questionable. Boots should be worn with either cotton or wool socks to help absorb the perspiration.
2. If the site situation requires the use of hard hats, chin straps should be used if a person will be stooping over where his/her hat may fall off. Respirator straps should not be placed over the hard hats. This will affect the fit of the respirator.

Some types of protective materials conduct heat and cold readily. In cold conditions, natural material clothing should be worn under the protective clothing. Protective clothing should be removed prior to allowing a person "to get warm". Applying heat, such as a space heater, to the outside of the protective clothing may drive the contaminants through. In hot weather, under clothing will absorb sweat. It is recommended that workers use all cotton undergarments.

3. Body protection should be worn and taped to prevent anything from running into the top of the boot. Gloves should be worn and taped to prevent substances from entering the top of the glove. Duct tape is preferred, but masking tape can be used. When aprons are used, they should be taped across the back for added protection. However, this should be done in such a way that the person has mobility.
4. Atmospheric conditions such as precipitation, temperature, wind direction, wind velocity, and pressure determine the behavior of contaminants in air or the potential for volatile material getting into the air. These parameters should be considered in determining the need for and the level of protection.
5. A program must be established for periodic monitoring of the air during site operations. Without an air monitoring program, any changes would go undetected and might jeopardize response personnel. Monitoring can be done with various types of air pumps and filtering devices followed by analysis of the filtration media; personnel dosimeters; and periodic walk-throughs by personnel carrying real-time survey instruments.
6. For operations in the exclusion zone, different levels of protection may be selected, and various types of chemical-resistant clothing may be worn. This selection should be based on the job function, reason for being in the area, and the potential for skin contact with, or inhalation of, the chemicals present.
7. Escape masks must be readily available when levels of respiratory protection do not include a SCBA and the possibility of an IDLH atmosphere exists. Their use can be made on a case-by-case basis. Escape masks could be strategically located at the site in areas that have higher possibilities of vapors, gases or particulates.

Subsurface Utility Clearance Management Program



**SUBSURFACE UTILITY CLEARANCE MANAGEMENT PROGRAM**

**CORPORATE HEALTH AND SAFETY MANAGER : Brian Hobbs, CIH, CSP**  
**EFFECTIVE DATE : 01/19**  
**REVISION NUMBER : 2**

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## **APPENDICES**

Appendix A – Definitions

Appendix B – Example of Completed One Call

Appendix C – Roux Subsurface Utility Clearance Checklist

Appendix D – Utility Verification/Site Walkthrough Record

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## **1. PURPOSE**

Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C., and Remedial Engineering (collectively, “Roux”) has instituted the following program for completing proper utility mark-outs and for conducting subsurface clearance activities. This establishes a method to ensure, to the greatest extent possible, that utilities have been identified and contact and/or damage to underground utilities and other subsurface structures will be avoided.

## **2. SCOPE AND APPLICABILITY**

The Subsurface Utility Clearance Management Program applies to all Roux employees, its contractors and subcontractors. Employees are expected to follow this program for all intrusive work involving Roux or other personnel (e.g., contractors/subcontractors) working for Roux unless the client’s requirements are more stringent. Deviation from the program regardless of the specific work activity or work location must be pre-approved based on client’s site knowledge, site experience and client’s willingness for the use of this program. Any and all exceptions shall be documented and pre-approved by the Project Principal and the Office Manager.

## **3. PROCEDURES**

### **3.1 Before Intrusive Activities**

During the project kick-off meeting for intrusive activities the PM will review the Roux Subsurface Utility Clearance Checklist and Utility Verification (Appendix C) / Site Walkthrough Record (Appendix D) and the below bullet points with the project field team:

(Please note that these are intended as general reminders only and should not be solely relied upon.)

- Ensure the Mark-out / Stake-out Request Information Sheet (or one-call report) is complete and accurate for the site including address and cross streets and review for missing utilities. (Note: utility mark-out organizations do not have contracts with all utilities and it is often necessary to contact certain utilities separately such as the local water and sewer authorities).
- Have written confirmation prior to mobilizing to the site that the firm or Roux personnel performing the intrusive activity has correctly completed the mark-out notification process including requesting mark-outs, waiting for mark-outs to be applied to ground surfaces at the site, and receiving written confirmation of findings (via fax or email) from utility operators for all known or suspected utilities in the proposed area of intrusive activity, and provided utility owner written confirmation to Roux personnel for review and project files documentation.
- Do not begin any intrusive activity until all utilities mark-out has been completed (i.e., did all utilities mark-out the site?) and any unresolved mark-out issues are finalized. Perform a site walk to review the existing utilities and determine if said utilities have been located by the utility locators.

(Note: The Tolerance Zone is defined as two feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks and other non-cylindrical utilities) of a utility and two feet from the outside edge of any subsurface structure.)

- Install Pre-Clearance exploratory test holes (e.g., hand-dug test holes or other soft digging techniques) for the first 5-ft below land surface (BLS) at each location prior to conducting mechanized intrusive activities. The size of the pre-clearance exploratory test hole should be at a minimum twice the diameter of any downhole tool or boring device. (Note: Pre-Clearance exploratory test holes should be defined in the SOW/proposal provided to the client to prevent project delays and to allow adequate time for PM and PP to evaluate alternative approaches for the project. Alternative approaches will need to be pre-approved by the OM.

- For excavations, all utilities need to be marked and then exposed by hand following the protocols in this program. Pre-clearing for excavations may be performed by the “moat” technique (i.e., soft digging around the perimeter). In these cases, dig in small lifts (<12” for first 5 feet) using a dedicated spotter.) For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes performed to expose the utility. Once structures have been verified a minimum clearance of two feet must be maintained between the utility and any powered equipment.
- In addition, the following activities should be conducted:
  - Review the work scope to be performed with the site owner/tenant to determine if it may impact any utilities;
  - Attempt to procure any utility maps or historic drawings of subsurface conditions of the site;
  - **Determine the need for utility owner companies to be contacted or to have their representatives on site;**
  - Where mark-outs terminate at the property boundary, consider the use of private utility locating / GPR / geophysical-type services which may be helpful in locating utilities. Use of private utility locating firms, however, does not eliminate the legal requirement for the Excavator firm to submit a request for Public Utility Mark-outs. Also, the information provided by the service may be inaccurate and unable to locate subsurface utilities and structures in urban areas, landfills, urban fill areas and below reinforced slabs, etc. They should not be relied upon as the only means of performing utility clearance;
  - Documented description of the dig site which is included in the projects Health and Safety Plan (HASP) and one call report will be maintained in the field and distributed amongst Roux personnel its contractors and subcontractors; and
  - Documentation of the actual placement of mark outs in the field shall be collected using dated pictures, videos and/or sketches with distance from markings to fixed objects. All documentation shall be maintained within the project file.

### **3.2 During Intrusive Activities**

The PM, field team lead or personnel performing oversight is to:

- Ensure the mark-out remains valid. (In certain states there are limits regarding the duration of time after the mark-out was applied to the ground surface work can be started or interrupted.) Additionally, the mark-outs must be maintained, documented, and in many cases refreshed periodically to be considered valid, this will be accomplished through calls to the one call center.
- Ensure intrusive activities are only performed within the safe boundaries of the mark-out as detailed in the One-Call Report.
- Halt all work if intrusive activities have resulted in discovery of an unmarked utility. Roux personnel shall notify the facility owner/operator and the one call center. All incidents such as this will be reported as per Roux Incident Investigation and Reporting Management Program.
- Halt all work if intrusive activities must take place outside of the safe boundaries of a mark-out and only proceed after new mark-outs are performed.
- Halt the intrusive activities and immediately consult with the PP if an unmarked utility is encountered.
- Completing any subsurface utility clearance incident reports that are necessary.

- If a utility cannot be found as marked Roux personnel shall notify the facility owner/operator directly or through the one call center. Following notification, the excavation may continue, unless otherwise specified in state law.
- Contractors/subcontractors must contact the one-call center to refresh the ticket when the excavation continues past the life of the ticket. Ticket life shall be dictated by state law however at a maximum ticket life shall not exceed 20 working days.

### **3.3 Stop Work Authority**

Each Roux employee has Stop Work Authority which he or she will execute upon determination of any imminent safety hazard, emergency situation, or other potentially dangerous situation, such as hazardous weather conditions. This Stop Work Authority includes subsurface clearance issues such as the adequacy of a mark-out or identification during intrusive operations of an unexpected underground utility. Authorization to proceed with work will be issued by the PM/PP after such action is reviewed and resolved. The PM will initiate and execute all management notifications and contact with emergency facilities and personnel when this action is appropriate.

**Appendix A - Definitions**

<b><i>Intrusive Work Activities</i></b>	All activities such as digging or scraping the surface, including but not limited to, excavation, test pitting or trenching, soil vapor sampling or the installation of soil borings, soil vapor monitoring points and wells, or monitoring wells, and drilling within the basement slab of a recently demolished building.
<b><i>Mark-out / Stake Out</i></b>	The process of contracting with a competent and qualified company to confirm the presence or absence of underground utilities and structures. This process will clearly mark-out and delineate utilities that are identified so that intrusive work activities can be performed without causing disturbance or damage to the subsurface utilities and structures. After utility mark-outs are completed the soft digging will be completed prior to intrusive work.
<b><i>Tolerance Zone</i></b>	Defined as two feet on either side of the designated centerline of an identified utility, plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct backs and other non-cylindrical utilities) of that utility and two feet from the outside edge of any subsurface structure.
<b><i>Structure</i></b>	For the purpose of this program a structure is defined as any underground feature that may a present potential source(s) of energy such as, but not limited to, utility vaults, bunkers, piping, electrical boxes, wires, conduits, culverts, utility lines, underground tanks and ducts.
<b><i>Soft Digging</i></b>	The safest way to remove material from unknown obstructions or services is by using tools such as a vactor or air knife, non-mechanical tools, or hand tools. The methods are clean and non-evasive and used for uncovering and exposing buried services, excavating and for providing a quick method of soil removal from sensitive areas.
<b><i>Verification</i></b>	Exploratory test-hole dug with hand tools within the Tolerance Zone to expose and verify the location, type, size, direction-of-run and depth of a utility or subsurface structure. Vacuum excavation (soft dig) methods can further facilitate exposure of a subsurface utility and accurately provide its location and identification prior to intrusive work approaching the Tolerance Zone.





## Appendix B - Example of Completed One Call Report

### *Example Completed One-Call Report*

New York 811

Send To: C\_EMAIL      Seq No: 744

Ticket No: 133451007    ROUTINE

Start Date: 12/16/13    Time: 7:00 AM      Lead Time: 20

State: NY      County: QUEENS      Place: QUEENS

Dig Street: 46TH AVE      Address:

Nearest Intersecting Street: VERNON BLVD

Second Intersecting Street: 11TH ST

Type of Work: SOIL BORINGS

Type of Equipment: GEOPROBE

Work Being Done For: ROUX

In Street: X    On Sidewalk: X    Private Property:    Other:

On Property Location if Private:    Front:    Rear:    Side:

Location of Work: MARK THE ENTIRE NORTH SIDE OF THE STREET AND SIDEWALK OF:  
46TH AVE BETWEEN VERNON BLVD AND 11TH STREET

Remarks:

Nad:    Lat:    Lon:    Zone:

ExCoord NW Lat: 40.7475399 Lon: -73.9534811 SE Lat: 40.7457406 Lon: -73.9493680

Company : ZEBRA ENVIROMENTAL      Best Time: 6AM-5PM

Contact Name: DAVID VINES      Phone: (516)596-6300

Field Contact: DAVID VINES      Phone: (516)596-6300

Caller Address: 30 N PROSPECT AVE      Fax Phone: (516)596-4422

LYNBROOK, NY 11563

Email Address: [david@zebraenv.com](mailto:david@zebraenv.com)

Additional Operators Notified:

ATTNY01    AT&T CORPORATION      (903)753-3145

CEQ      CONSOLIDATED EDISON CO. OF N.Y      (800)778-9140

MCINY01    MCI      (800)289-3427

PANYNJ01    PORT AUTHORITY OF NY & NJ      (201)595-4841

VZQ      VERIZON COMMUNICATIONS      (516)297-1602

Link to Map for C\_EMAIL: <http://ny.itic.occinc.com/XGMZ-DF2-L23-YAY>

Original Call Date: 12/11/13    Time: 1:15 PM    Op: webusr

IMPORTANT NOTE: YOU MUST CONTACT ANY OTHER UTILITIES DIRECTLY

## Appendix C - Roux Subsurface Utility Clearance Checklist

### Roux Subsurface Utility Clearance Checklist

Date of Revision –  
12/3/14

#### Work site set-up and work execution

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
Daily site safety meeting conducted, SPSAs performed, JSAs reviewed, appropriate work permits obtained.				
HASP is available and reviewed by site workers / visitors.				
Subsurface Utility Clearance Procedure has been reviewed with all site workers.				
Work area secured; traffic control established as needed. Emergency shut-off switch located. Fire extinguishers / other safety equipment available as needed.				
Utility mark-outs (public / private) clear and visible. Provide Excavator's Stake-Out Reference Number / Request Date / Time.				
Tolerance zone work identified.				
Work execution plan reviewed and adhered to (ground disturbance methods, clearance depths, any special utility protection requirements, or any other execution requirements; especially for Tolerance Zone work).				
Verbal endorsement received from Roux PM for any required field deviations to work execution plan.				

#### Key reminders for execution:

The Subsurface Utility Clearance Protocol should be referenced to determine all requirements while executing subsurface work. The bullet points below are intended as general reminders only and should not be solely relied upon.

- Tolerance zone is defined as two feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks and other non-cylindrical utilities) of a utility and two feet from the outside of any subsurface structure.
- Install Pre-Clearance exploratory test holes (e.g., hand-dug test holes or vacuum excavation) must be performed for the first five feet below land surface (BLS) at each location prior to conducting mechanized intrusive activities. The size of the pre-clearance exploratory test hole should be at a minimum twice the diameter of any downhole tool or boring device. (Note: Pre-clearance exploratory test holes should be defined in the SOW/proposal provided to the client to prevent project delays and to allow adequate time for PM and PP to evaluate alternative approaches for the project. Alternate approaches will need to be pre-approved by the OM.
- For excavations, all utilities need to be marked and then exposed by hand following the protocols in this program. Pre-clearing for excavations may be performed by the "moat" technique (i.e., soft

digging around the perimeter). In these cases, dig in small lifts (<12" for first five feet) using a dedicated spotter.) For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes to expose the utility. Once structures have been verified a minimum clearance of two feet must be maintained between the utility and any powered equipment.

## Appendix D - Utility Verification/Site Walkthrough Record

Employee Name: \_\_\_\_\_

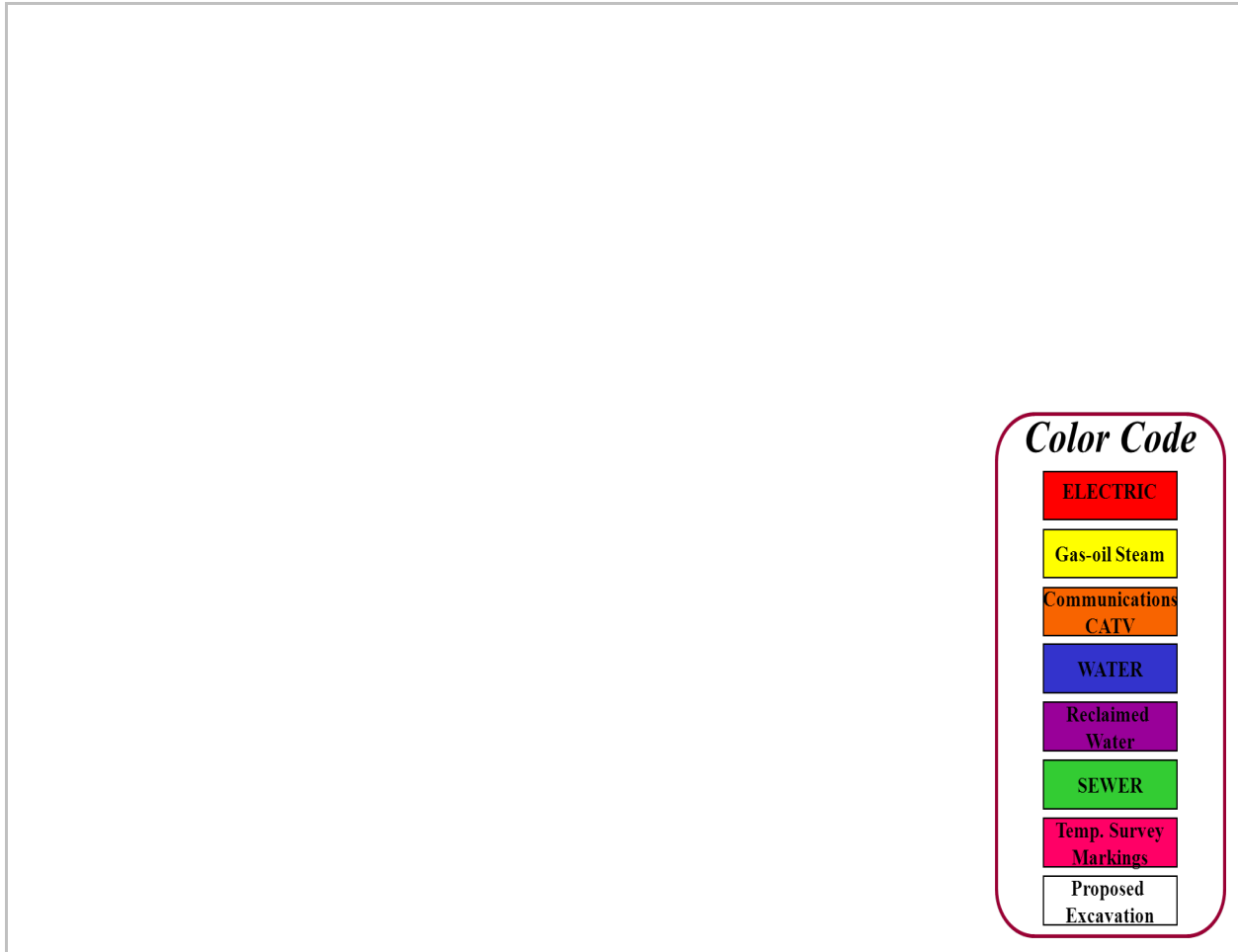
Date: \_\_\_\_\_

**Instructions:** For each utility suspected at the job site, indicate location on the job site, approximate burial depth, and means of detecting the utility. Leave blank if that utility is not believed to be present.

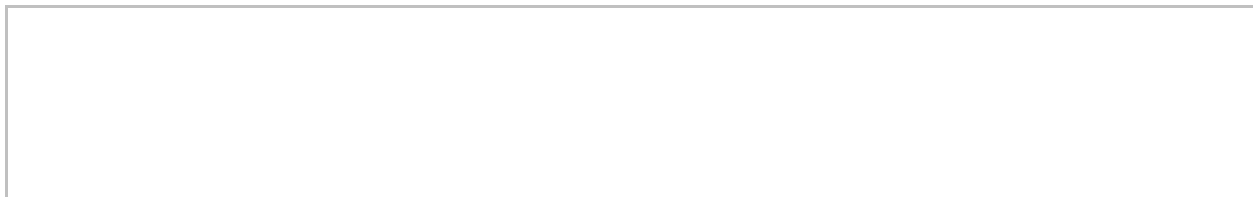
Utility	Description of Utility Location Identified Onsite	Approx. Depth (bls)	Method / Instrumentation used to determine Utility Location	Utility Owner Response (Date/Time)	Mark Out Indicates (Clear / Conflict)
Electrical Lines					
Gas Lines					
Pipelines					
Steam Lines					
Water Lines					
Sanitary and Stormwater Sewer lines					
Pressured Air-Lines					
Tank Vent Lines					
Fiber Optic Lines					
Underground Storage Tanks					
Phone Lines/ Other					

\* bls - below land surface

Site Sketch Showing Utilities:

***Color Code*****ELECTRIC****Gas-oil Steam****Communications  
CATV****WATER****Reclaimed  
Water****SEWER****Temp. Survey  
Markings****Proposed  
Excavation**

Other Comments / Findings:



Completed by: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Site-Specific Health and Safety Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**APPENDIX E**

Heavy Equipment Exclusion Zone Policy



**HEAVY EQUIPMENT EXCLUSION ZONE  
MANAGEMENT PROGRAM**

**CORPORATE HEALTH AND SAFETY MANAGER : Brian Hobbs, CIH, CSP**  
**EFFECTIVE DATE : 01/2019**  
**REVISION NUMBER : 1**

## TABLE OF CONTENTS

1. PURPOSE.....	2
2. SCOPE AND APPLICABILITY.....	2
3. PROCEDURES.....	2
3.1 Exceptions.....	3
4. TRAINING .....	3



## **1. PURPOSE**

The purpose of the Exclusion Zone Management Program is to establish the minimum clearance distance that must be maintained between workers and heavy equipment while equipment is in operation (i.e., engaged or moving). The intent is to have no personnel or equipment entering the Exclusion Zone while the equipment is in operation or moving to ensure that Roux and Subcontractor employees are not unnecessarily exposed to the hazards of the equipment.

## **2. SCOPE AND APPLICABILITY**

This Management Program applies to all Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, "Roux") employees and their subcontractors who are performing field work and are potentially exposed to heavy equipment. For the purpose of this program, heavy equipment includes, but is not necessarily limited to: excavation equipment, drill rigs, vacuum trucks, forklifts, lull telehandlers, man lifts, bobcats, delivery trucks, etc.

## **3. PROCEDURES**

As specified in the following sections of this Program, an Exclusion Zones must be established and maintained during activities involving the movement/operation of heavy equipment. The Exclusion Zone requirements apply to all personnel on the site but are primarily focused on those personnel who are required to be working in the vicinity of the equipment. The exclusion zone is in effect when heavy equipment is moving or engaged (ex. movement of an arm or bucket of an excavator, rotation of an auger, lifting of a load with a forklift, raising/lowering of a man lift, etc.).

1. The Exclusion Zone must meet the following minimum requirements:

- A minimum distance of 10 feet from all heavy equipment and loads being moved by the equipment;
- Greater than the swing/reach radius of any moving part on the heavy equipment (i.e., for large equipment this may mean an exclusion zone distance larger than 20 feet);
- Greater than the tip-over distance of the heavy equipment; and
- Greater than the radius of blind spots.

The size of the Exclusion Zone will need to be determined on a task-specific basis considering the size of the heavy equipment in use and the task being performed. Prior to all heavy equipment operations, the Exclusion Zone(s) distance must be specifically identified in the Job Safety Analysis (JSA).

2. The spotter (or another individual) should be assigned responsibility for enforcing the Exclusion Zone. The spotter should be positioned immediately outside of the Exclusion Zone within a clear line of sight of the equipment operator. The spotter must signal the operator to stop work if anyone or anything has the potential to enter or compromise the Exclusion Zone. The operator should stop work if the spotter is not within his/her line of sight. If multiple pieces of equipment are being used, each piece of equipment must have its own Exclusion Zone and spotter. For large excavation and demolition projects the spotter should be in constant radio contact (not cell phone) with the machine driver.
3. If an individual must enter the Exclusion Zone, the designated Spotter must signal the Equipment Operator to stop the equipment. Once the equipment is no longer moving (ex. movement of an arm of an excavator is STOPPED, lifting of a load with a forklift STOPPED, raising/lowering of a man lift is

STOPPED, etc.), the operator must DISENGAGE THE CONTROLS and STOP and SIGNAL BY “SHOWING HIS HANDS”. This signal will indicate that it is safe for the personnel to enter the limits of the Exclusion Zone to perform the required activity. The equipment must remain completely stopped/disengaged until all personnel have exited the limits of the Exclusion Zone and the designated Spotter has signaled by “SHOWING HIS HANDS” to the Equipment Operator that it is safe to resume operations.

4. When entering the limits of the Exclusion Zone, personnel must at a minimum:
  - Establish eye contact with the operator and approach the heavy equipment in a manner that is in direct line of sight to the Equipment Operator;
  - Never walk under any suspended loads or raised booms/arms of the heavy equipment; and
  - Identify a travel path that is free of Slip/Trip/Fall hazards.
5. The Exclusion Zone should be delineated using cones with orange snow fence or solid poles between the cones, barrels, tape or other measures. For work in rights-of-way rigid barriers, such as Jersey barriers or temporary chain link fence should be used. For certain types of wide-spread or moving/mobile equipment operations, such delineation may not be practicable around pieces of equipment or individual work areas. In such instances, it is expected that the entire operation will be within a larger secure work area or that additional means will be utilized to ensure security of the work zone.

All subcontractors who provide heavy equipment operations to field projects must implement a program that meets or exceeds the expectations described above as well as any additional requirements that may be required on a client or site-specific basis.

### **3.1 Exceptions**

It is recognized that certain heavy equipment activities may require personnel to work within the limits of the Exclusion Zone as specified in this program. Such activities may include certain excavation clearance tasks, drill crew activities or construction tasks. However, any such activity must be pre-planned with emphasis on limiting the amount and potential exposure of any activity required within the zone. The critical safety steps to mitigate the hazards associated with working within the Exclusion Zone must be defined in the JSA and potentially other project-specific plans (i.e., critical lift plans, etc.), and approved by the Roux Project Principal and client representative, if required, prior to implementation.

## **4. TRAINING**

Many Roux projects have different requirements that are client-specific or site-specific in nature. It is the responsibility of the Project Principal (or Project Manager if delegated this responsibility by the Project Principal) to ensure that the workers assigned to his/her projects are provided orientation and training with respect to these client and/or site-specific requirements.

**Site-Specific Health and Safety Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**APPENDIX F**

Generic Community Air Monitoring Plan

## **APPENDIX F**

### **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**

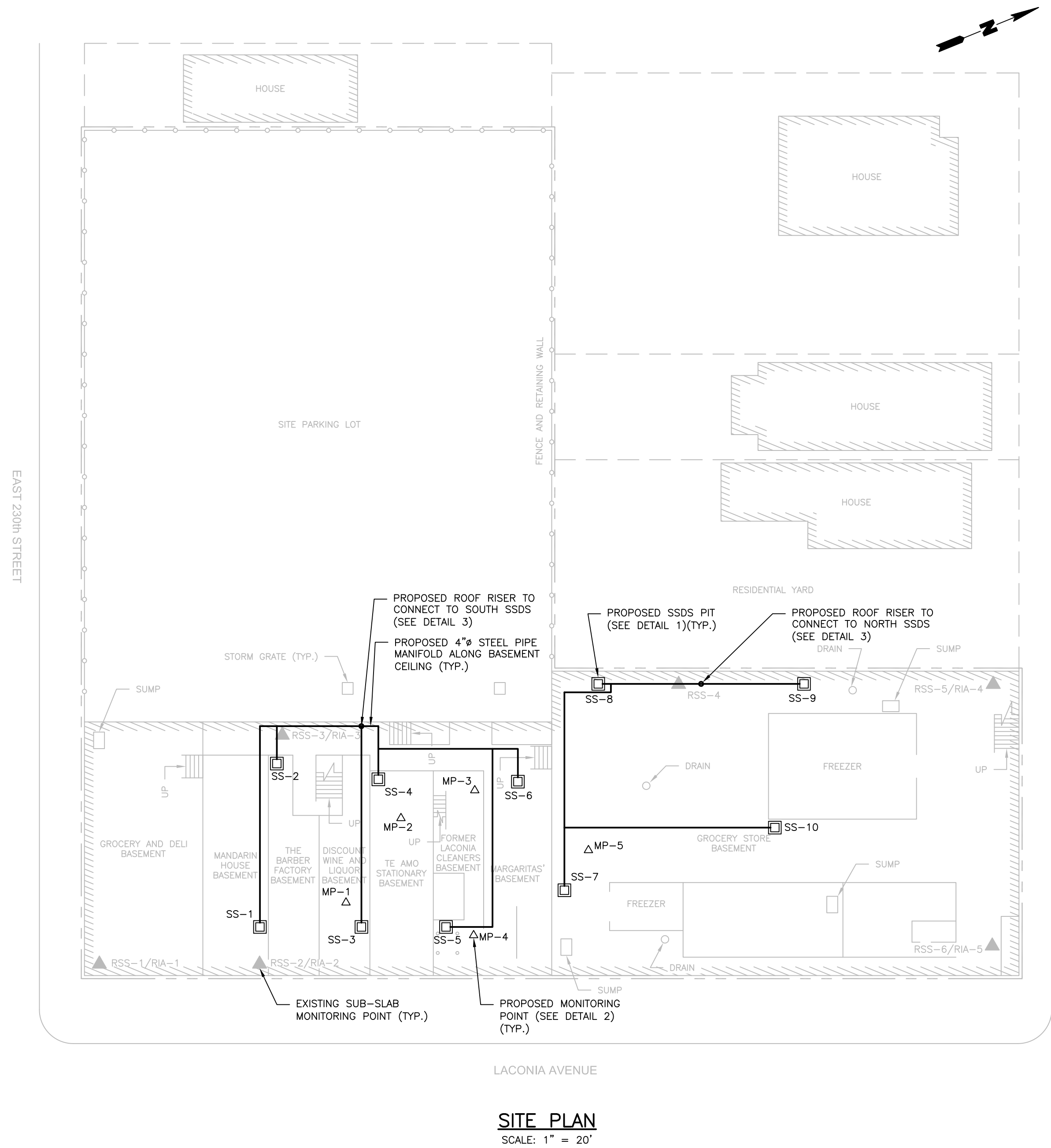
Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring

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 ( $\text{mcg}/\text{m}^3$ ) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed  $150 \text{ mcg}/\text{m}^3$  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  $150 \text{ mcg}/\text{m}^3$  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  $150 \text{ mcg}/\text{m}^3$  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.

**APPENDIX B**

**Sub-Slab Depressurization System Design Drawings**



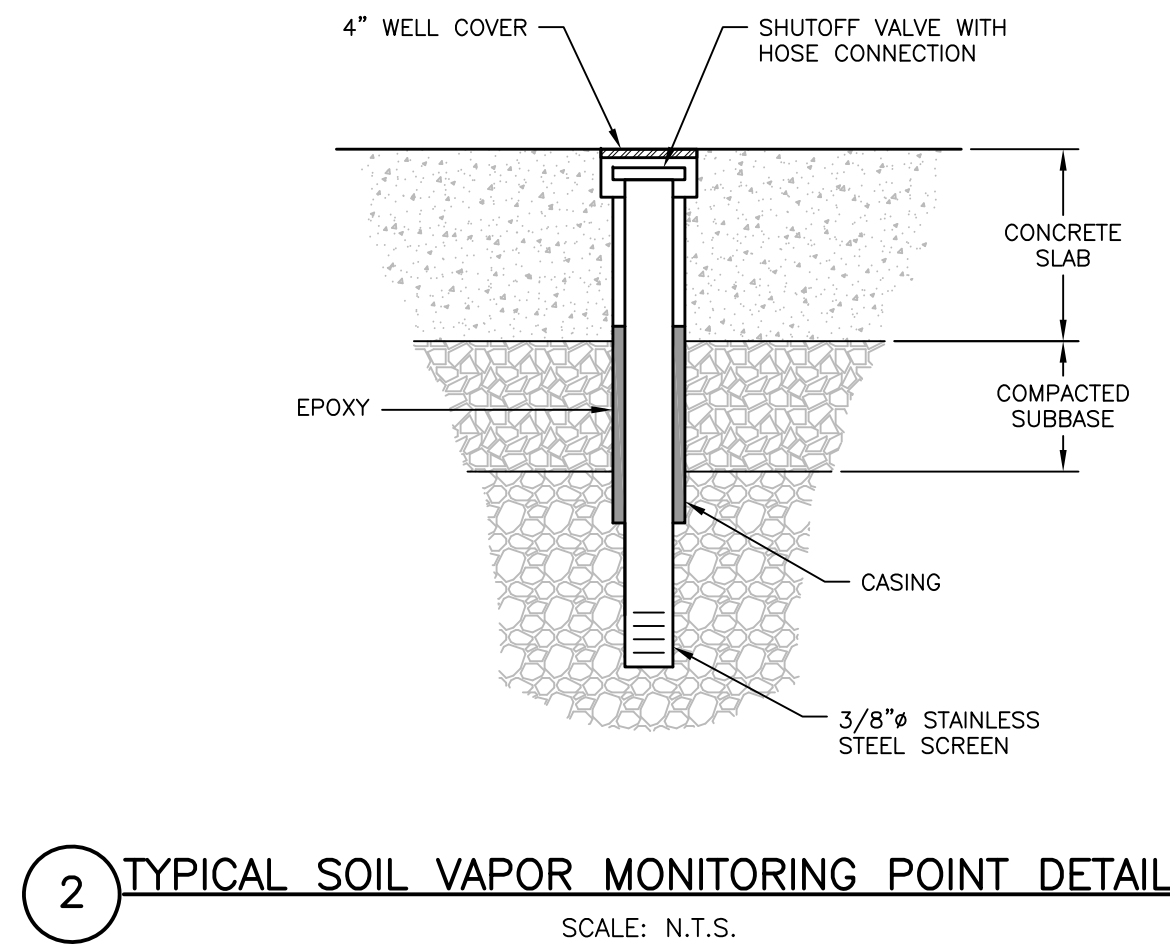
**SITE PLAN**  
SCALE: 1" = 20'

**SUB-SLAB PLAN NOTES**

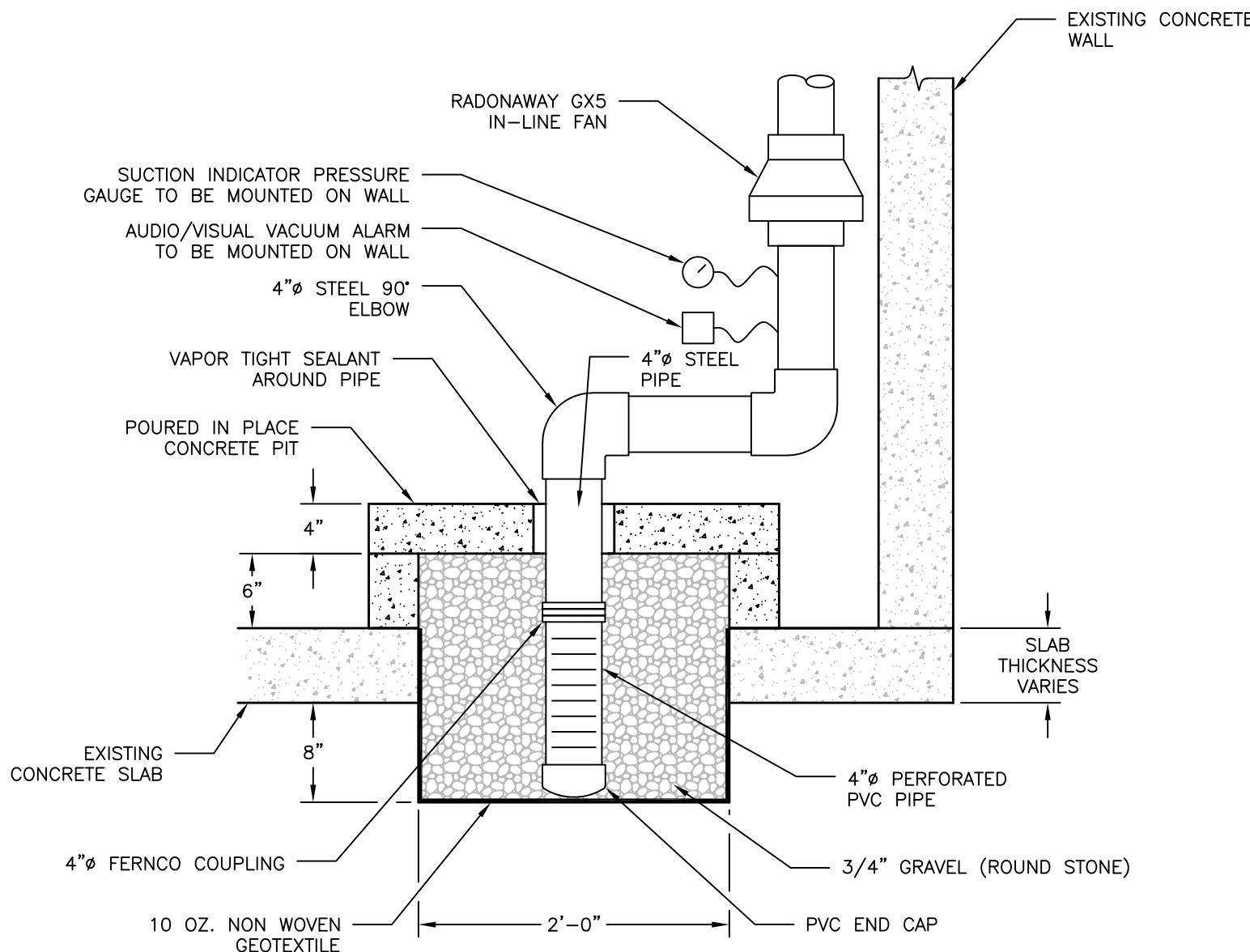
- CONTRACTOR SHALL COORDINATE INSTALLATION OF SUB-SLAB DEPRESSURIZATION SYSTEM WITH THE FOUNDATION, PLUMBING, MECHANICAL AND ELECTRICAL CONTRACTORS.
- CONTRACTOR SHALL FIELD VERIFY THE DESIGN INVERT ELEVATIONS (BOTTOM OF PIPING) FOR THE WALL PENETRATIONS. THE CONTRACTOR SHALL ALSO FIELD VERIFY THE HORIZONTAL OFFSETS FOR THE LOCATIONS OF THE VERTICAL RISERS.

**SSDS NOTES**

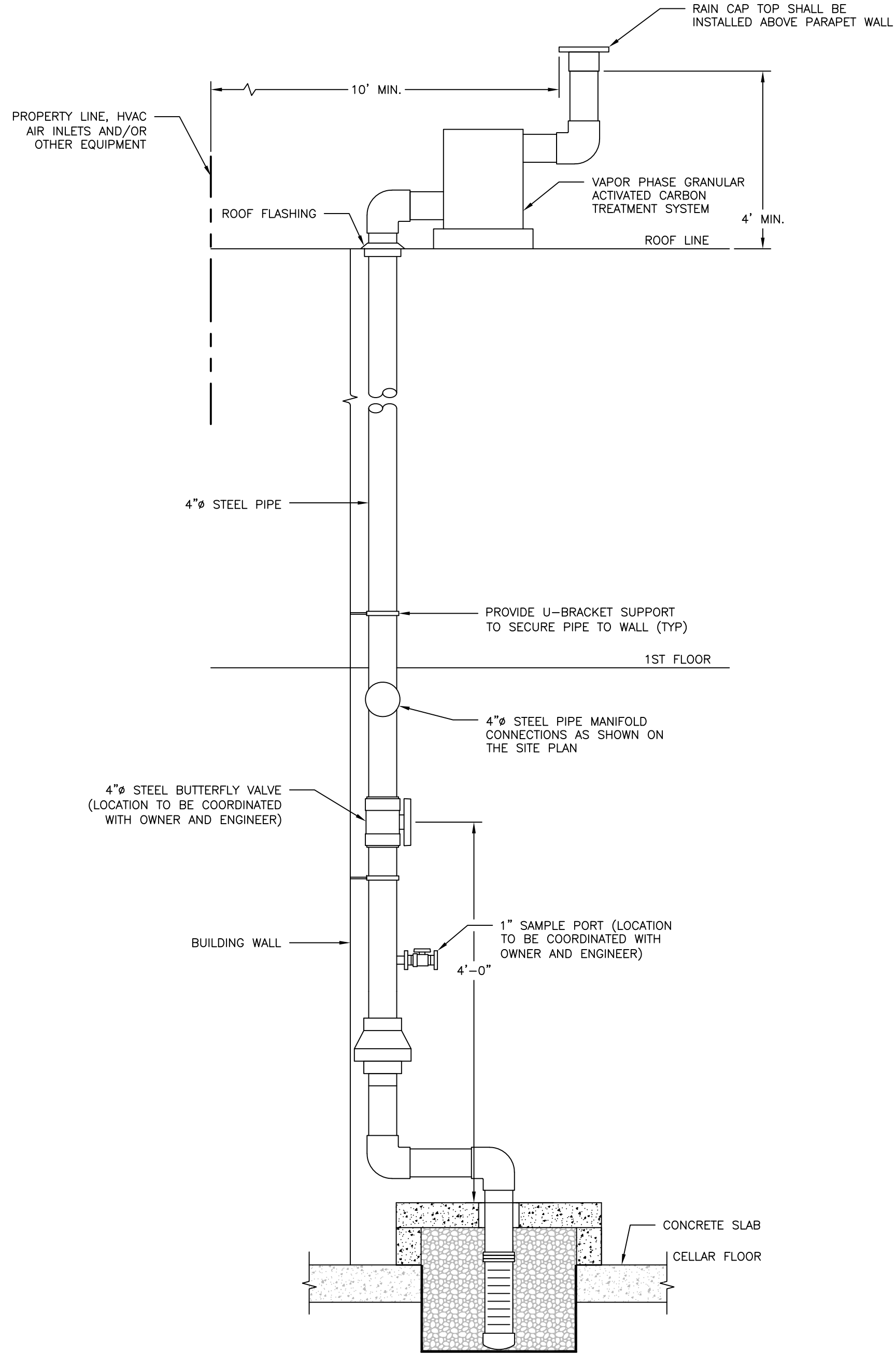
- CONTRACTOR SHALL COORDINATE WITH PLUMBING, MECHANICAL, CIVIL AND ELECTRICAL CONTRACTORS FOR ALL UTILITY CROSSINGS.
- ALL SSDS PIPING SHALL BE SLOPED TOWARDS THE PERFORATED PIPE PITS TO PREVENT ANY POTENTIAL MOISTURE BUILD UP AND BLOCKAGES.
- THE SURFACES TO BE LINED WITH GEOTEXTILE SHALL BE FREE OF ALL ROCKS, STONES, SHARP OBJECTS OR CONSTRUCTION DEBRIS OF ANY KIND.
- INSTALL GEOTEXTILE NONWOVEN FABRIC DIRECTLY ON FILL. MATERIAL OVERLAPS SHALL BE A MINIMUM OF 12" THE OVERLAPPED SEAMS WILL BE SEALED WITH TAPE.
- ALL PENETRATIONS THROUGH THE SLAB ON GRADE (SOG) SHALL BE SEALED USING A SILICONE BASED WATERPROOF SEALANT OR EQUIVALENT.
- EACH SSDS PIT SHALL BE INSTALLED WITH A RADONAWAY GX5 IN-LINE FAN, PRESSURE GAUGE AND ALARM WITH INDICATOR LIGHT VISIBLE TO THE SITE SUPERVISOR FOR INSPECTION OF OPERATION.



**2 TYPICAL SOIL VAPOR MONITORING POINT DETAIL**  
SCALE: N.T.S.



**1 SUB-SLAB DEPRESSURIZATION SYSTEM PIT DETAIL**  
SCALE: N.T.S.



**3 RISER DETAIL**  
SCALE: N.T.S.

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF STATE LAW.

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PROJ. ENGINEER: D.K.	DRAWN BY: G.M.
DESIGNED BY: D.K.	CHECKED BY: C.M.
DRAWING SCALE: AS SHOWN	PLOT SCALE: 1:1
DRAWING DATE: 26NOV19	PRINT TYPE: B&W
OFFICE: NY	PAPER SIZE: ARCH D
PROJECT NO.: 3390.0001Y000	
DRAWING FILE: 3390.0001Y104.02.REV.DWG	



Roux Environmental  
Engineering and Geology, D.P.C.  
209 SHAFTER STREET ISLANDIA NEW YORK 11749  
(631) 232-2600

PROJECT NAME:  
**4125-4149 LACONIA AVENUE  
BRONX, NEW YORK**  
PROJECT FOR:  
**LACONIA PROPERTIES LLC**

TITLE:  
**SUB-SLAB DEPRESSURIZATION  
SYSTEM PLAN AND DETAILS**

DRAWING NO.  
**1**  
DRAWING  
1 OF 1



**APPENDIX C**

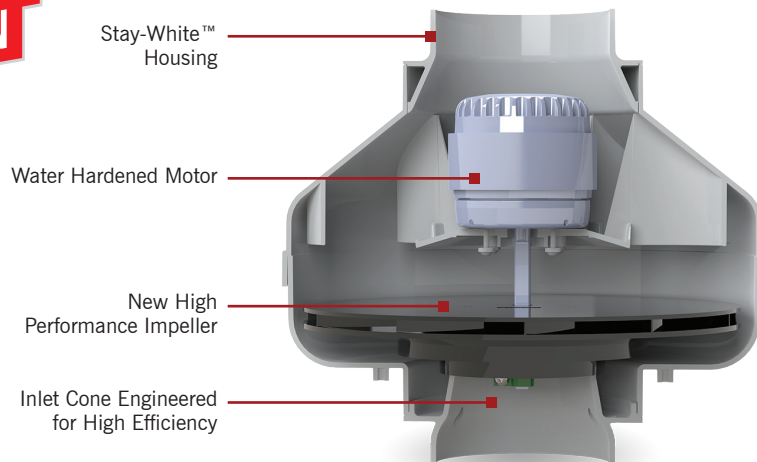
**Sub-Slab Depressurization System Component Specifications**

# GX5 FAN

COMING  
SOON



GX5



## SPECIFICATIONS

MODEL	FAN DUCT DIAMETER	WATTS	RECOM. MAX. OP. PRESSURE "WC	TYPICAL CFM vs. STATIC PRESSURE WC					
				0"	1.0"	2.0"	3.0"	4.0"	5.0"
GX5	4"	77-133	5.0	174	150	121	87	50	8

See p. 22 for fan dimensions.



Made in the USA with U.S. and imported parts.



ETL Listed



RadonAway® inline radon fans are covered by our 5-year, hassle-free warranty.

## PRICING

MODEL	P/N	UNIT PRICE		
		1-3	4-7	8+
GX5	28536			

Quantity discounts determined by number of RadonAway® fans (any model) per order.



### TECH TIP 6.5" MANOMETER

Designed and manufactured in RadonAway's Massachusetts production facility, the new 6.5" Easy Read U-tube Manometer is made specifically for the GX5's higher vacuum pressure. However, since the gauge shows from 0" - 6.5" WC, it can also be used with other RadonAway radon fans.

For more information on the 6.5" Manometer, see p. 27.



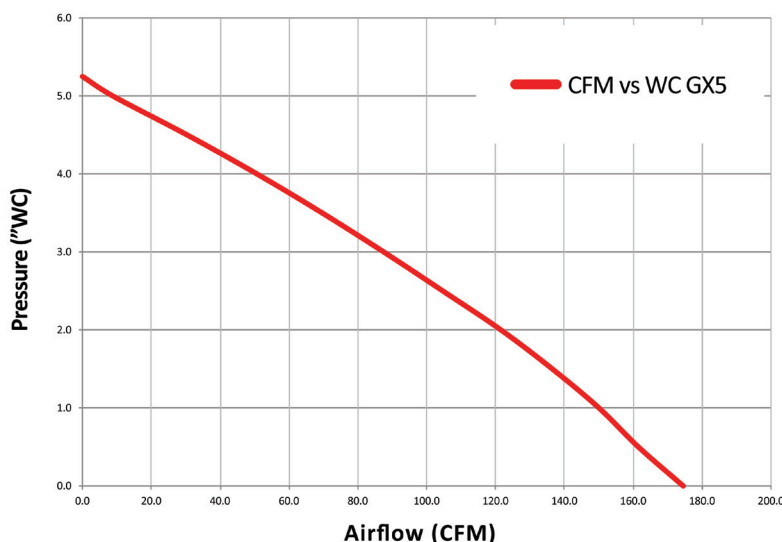
## FEATURES

- Stay-White™ Housing
- Quiet Operation
- Water-Hardened Thermally-Protected Motor
- 4" Duct for Use with 3" or 4" Pipe
- Sealed Seams to Inhibit Radon Leakage
- Electrical Box for Hard Wire or Plug In
- For Indoor or Outdoor Use
- Rated for Commercial or Residential Use
- New Revolutionary Impeller
- Modern "RP Style" Housing

### Experience the POWER of the GX5!

Capable of operating at 5" of vacuum, our revolutionary GX5's power will blow you away.

## GX Performance Curves



## INSTALLATION ACCESSORIES

ITEM	SIZE	COLOR	P/N	QTY / CASE	UNIT PRICE		
					<CASE	CASE*	3+ CASES*
Flexible Couplings	3 x 4	black white	79011 79038	40			
	4 x 4	black white	79012 79040	40			
	4 x 6	black white	79013 79039	20 30			

NOTE: Coupling sizes are for selection only, actual sizes may vary fractionally. See Flexible Coupling Sizing Chart on p. 25 or at [radonaway.com/couplings](http://radonaway.com/couplings)

\*Price applies to case quantities only.

ITEM	COLOR	P/N	QTY / CASE	UNIT PRICE		
				< CASE	CASE	2+ CASES*
6.5" U-tube Manometer	Blue	50036	50			

\*Must be purchased in case quantity. For more package details see p. 27.

**6.5" U-tube package includes:**

Hangable bag with homeowner brochure and all system labels to help you to comply with RRNC 2.0 "Model Code" Standard (see p. 87) and provide important system information.

ITEM	P/N	PRICE
6' Power Cord Kit <sup>1,3</sup>	27005	
6' Power Cord Kit <sup>2</sup>	27009	
8' Power Cord Kit <sup>1,3,4</sup>	27004	
Fan Mounting Bracket	25007	
RP380 Mounting Bracket	25033-1	
Transition Fitting <sup>5</sup>	13245	

<sup>1</sup>18 ga 3-prong plug and bushing

<sup>2</sup>16 ga 3-prong plug and bushing

<sup>3</sup>Not in IN

<sup>4</sup>See p. 53 for details and case pricing

<sup>5</sup>Not for use in Canada



Flexible Couplings  
79011



Flexible Couplings  
79039



Transition Fitting  
13245



Fan Mounting Bracket  
25007



6' Power Cord Kit  
27005

**Sub-Slab Depressurization System Operations and  
Maintenance Log**

# **SUB-SLAB DEPRESSURIZATION SYSTEM OPERATIONS AND MAINTENANCE FORM**

Site Name:	Laconia Avenue	Inspection Date: _____  Inspection Personnel: _____
Street Address:	4125-4149 Laconia Avenue	
Location:	Bronx, New York	
System:	Active Sub-Slab Depressurization System	
In-line Fan:	RadonAway® GX5 Fan	
Fan Range:	5 IWG pressure, 8 cfm / 0 IWG pressure, 174 cfm	

INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Is the system operating normally?	___	___	_____
Are any warning lights on? (Please list those that are on)	___	___	_____
If there is an alarm condition, was it fixed and the system restarted?	___	___	_____
Is the fan enclosure in good condition?	___	___	_____
Are the valves (at fan and aboveground piping) in good condition?	___	___	_____
Are vacuum/pressure gauges at fan operating properly?	___	___	_____
Are exterior piping free of cracks, leaks, and support issues?	___	___	_____
Are interior piping free of cracks, leaks, and support issues?	___	___	_____

List maintenance activities that were performed or  
other comments about the system: \_\_\_\_\_

Fan Influent	Vacuum (in. w.c.)	Comments
SS-1		
SS-2		
SS-3		
SS-4		
SS-5		
SS-6		
SS-7		
SS-8		
SS-9		
SS-10		

Soil Vapor Monitoring Point*	Vacuum (in. w.c.)	Comments
RSS-1		
RSS-2		
RSS-3		
RSS-4		
RSS-5		
RSS-6		
MP-1		
MP-2		
MP-3		
MP-4		
MP-5		

BUILDING CELLAR INSPECTION	Comments/ Actions Taken
Describe General Condition of Slab	_____
Describe an Cracks or New Penetrations	_____
Describe any Patching	_____

in. w.c. - inches of water  
\* Refer to figure for locations of Soil Vapor Monitoring Points and Suction Points

Sub-Slab Soil Vapor, Indoor Air and  
Outdoor Air Sample Analysis (Merritt, January 2019)

TABLE 4: SUB-SLAB SOIL VAPOR, INDOOR AIR & OUTDOOR AIR SAMPLE ANALYSIS EPA Method TO-15, detected compounds only							
Compound	IA1	IA2	IA3	IA4	SV1	SV2	OA1
Acetone	52.7	141	47.8	285	131	42.8	11.6
Carbon disulfide	ND	0.4J	ND	ND	9.97J	12.8J	ND
Methylene Chloride	8.34	6.6	5.91	18.1	ND	ND	12.2
2-Butanone (methyl ethyl ketone)	5.9	5.6	2.77	4.13	5.6J	ND	2.04
Chloroform	0.51J	5.86	2	1.66J	11.7J	56.6	ND
Dichlorodifluoromethane	1.04J	0.89J	1.04J	0.99J	ND	19.3J	1.04J
Trichlorofluoromethane	1.46J	1.85J	1.69J	1.4J	ND	ND	1.46J
Chloromethane	1.57	1.38	1.38	1.22	ND	3.1J	1.2
Tetrahydrofuran	ND	ND	ND	2.12	ND	ND	ND
Methyl tert-butyl ether (MTBE)	ND	ND	ND	ND	ND	16.6J	ND
Benzene	0.99J	7.67	7.03	1.57J	ND	3.83J	1.31J
Ethylbenzene	0.83J	1.35J	0.78J	0.69J	6.52J	ND	2.04J
Toluene	37.7	16.2	13.6	24.5	17	10.9J	43.3
Xylenes	4.09J	6.52	3.78J	3.57J	36.1J	39.1J	6.86
1,2,4-Trimethylbenzene	2.26J	2.9	1.57J	3.39	18.7J	25.6	1.28J
1,3,5-Trimethylbenzene	0.69J	1.08J	0.54J	0.88J	6.88J	7.87J	ND
1,4-Dichlorobenzene	ND	0.9J	1.56J	0.6J	ND	ND	ND
4-Ethyltoluene	0.84J	0.88J	0.49J	0.98J	6.88J	7.37J	ND
2,2,4-Trimethylpentane	1.68J	2.9	1.54J	1.12J	ND	ND	4.11
Cyclohexane	0.86J	1.2J	ND	ND	ND	ND	1.45J
Hexane	20.8	ND	8.81	16.2	26.4	14.8J	24.7
Heptane	1.68J	2.38	1.15J	1.23J	ND	ND	2.25
Naphthalene	0.94J	0.63J	1.31J	0.84J	ND	ND	ND
Methyl methacrylate	12.7	1.15J	ND	323	ND	ND	ND
Styrene	ND	1.32J	0.68J	ND	ND	ND	ND
Carbon Tetrachloride	0.5	0.57	0.5	0.44	ND	ND	0.44
Trichloroethene	2.42	8.06	1.56	1.61	5911	3385	0.43
Perchloroethylene	21.7	46.8	9.49	15.6	303199	28480	0.54
cis-1,2-Dichloroethene	0.71J	2.93	ND	0.52J	594	515	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	67	396	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	6.74J	ND
Vinyl chloride	ND	ND	ND	ND	ND	9.46	ND

#### NOTES

1. All results are expressed in micrograms per cubic meter of air (ug/m<sup>3</sup>)
2. J = Concentration is approximate and is less than the quantitation limit but greater than the method detection limit (MDL)
3. "ND" Not Detected

Several substances were reported in all samples and all are common laboratory-introduced VOCs. Table 1 clusters these VOCs as the first five listed substances. MECC does not consider these reported VOCs as representative of actual Site conditions. In addition, the laboratory-introduced substances (specifically acetone) were detected at concentrations that greatly exceed levels of other individual VOCs detected in the various samples.

The Final Guidance was used to evaluate the laboratory data. The Final Guidance provides an Air Guidance Value (AGV) of 30 ug/m<sup>3</sup> for PCE in indoor air, which is the maximum recommended PCE vapor concentration. This AGV was exceeded in Sample No. IA2, which was collected in the basement of the grocery store. Further, the Final Guidance recommends "mitigate" when any sub-slab soil vapor sample analysis shows a PCE concentration in excess of 1,000 ug/m<sup>3</sup>, regardless of any reported PCE vapor level in indoor air. Laboratory analysis of the two (2) sub-slab soil vapor samples collected by MECC shows PCE vapor at concentrations that are orders of magnitude greater than 1,000 ug/m<sup>3</sup>, and mitigation in the form of a sub-slab depressurization system is necessary.

**Interim Remedial Measures Work Plan**  
***4125-4149 Laconia Avenue, Bronx, New York***

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**PLATE**

Soil Vapor and Air Detections



V:\CADD\PROJECTS\3390\1102\_3390\_0001\102.01.DWG

RIA-2	10/08/2019	10/08/2019 DUP
VOCs (µg/m³)		
1,1,1-Trichloroethane (TCA)	0.256	0.295
1,2,4-Trimethylbenzene	1.93	1.97
1,2-Dichlorobenzene	1.82	1.85
1,4-Dichlorobenzene	1.26	1.26
2,2,4-Trimethylpentane	3.68	3.8
Acetone	5.06	4.28
Benzene	1.09	1.12
Carbon Tetrachloride	0.421	0.472
Chloroform	2.47	2.48
Chloromethane	1.05	1.06
Cis-1,2-Dichloroethylene	0.083	0.083
Cyclohexane	1.04	1.09
Dichlorodifluoromethane	2.09	2.05
Ethanol	12.1	12.6
Ethylbenzene	1.46	1.47
Isopropanol	5.53	5.95
m,p-Xylene	4.31	4.52
Methylene Chloride	12.1	12.4
N-Heptane	1.62	1.9
N-Hexane	3.04	3.06
O-Xylene (1,2-Dimethylbenzene)	1.73	1.8
Tetrachloroethylene (PCE)	27.8	28.2
Tetrahydrofuran	ND	2.9
Toluene	5.16	5.28
Trichloroethylene (TCE)	0.666	0.683
Trichlorofluoromethane	2.28	2.35

RIA-3	10/08/2019
VOCs (µg/m³)	
2,2,4-Trimethylpentane	1.22
Acetone	6.98
Carbon Tetrachloride	0.465
Chloromethane	1.04
Dichlorodifluoromethane	1.88
Ethanol	202
Isopropanol	6.74
N-Heptane	1.48
N-Hexane	1.03
Trans-1,2-Dichloroethene	1.95
Toluene	2.05

RSS-3	10/08/2019
VOCs (µg/m³)	
Acetone	16.8
Chloroform	286
Cis-1,2-Dichloroethylene	28.5
Isopropanol	18.4
Tetrachloroethylene (PCE)	2200
Toluene	5.73
Trans-1,2-Dichloroethene	6.82
Trichloroethylene (TCE)	392

IA4	12/4/2018
VOCs (µg/m³)	
Dichlorodifluoromethane	0.99 J
Chloromethane	1.22
Tetrahydrofuran	2.12
Trichlorofluoromethane	1.4 J
Heptane	1.25 J
Acetone	285 D
Methylene Chloride	18.1
2-Butanone	4.13
Carbon Tetrachloride	0.44
cis-1,2-Dichloroethene	0.52 J
Chloroform	1.66 J
2,2,4-Trimethylpentane	1.12 J
Benzene	1.57 J
Tetrachloroethylene (PCE)	15.6
Toluene	24.5
Trichloroethylene (TCE)	1.61
Ethyl Benzene	0.63 J
Xylenes (total)	3.57 J
1,3,5-Trimethylbenzene	0.88 J
1,2,4-Trimethylbenzene	43.3
Trichloroethylene (TCE)	0.43
Ethyl Benzene	2.04 J
Xylenes (total)	6.86 J
1,2,4-Trimethylbenzene	16.2
Hexane	323 D

OA1	12/4/2018
VOCs (µg/m³)	
Dichlorodifluoromethane	1.04 J
Chloromethane	1.2
Trichlorofluoromethane	1.46 J
Heptane	2.25
Acetone	11.6
Methylene Chloride	12.2
Cyclohexane	1.45 J
2-Butanone	2.04
Carbon Tetrachloride	0.44
2,2,4-Trimethylpentane	4.11
Benzene	1.31 J
Tetrachloroethylene (PCE)	0.54
Chloroform	43.3
Cis-1,2-Dichloroethylene	0.43
Isopropanol	1.01
Chloromethane	2.04 J
Dichlorodifluoromethane	1.94
Tetrachloroethylene (PCE)	0.251
Hexane	24.7

AA-1	10/08/2019
VOCs (µg/m³)	
1,1-Dichloroethene	4.13
Carbon Tetrachloride	6.403
Chloromethane	1.01
Dichlorodifluoromethane	1.94
Tetrachloroethylene (PCE)	0.251
Toluene	0.769

RSS-4	10/08/2019
VOCs (µg/m³)	
1,1-Dichloroethene	8.52
Chloroform	15.4
Cis-1,2-Dichloroethylene	484
Isopropanol	14.9
Tetrachloroethylene (PCE)	3890
Trans-1,2-Dichloroethene	1290
Trichloroethylene (TCE)	2330

IA3	12/4/2018
VOCs (µg/m³)	
Dichlorodifluoromethane	1.04 J
Chloromethane	1.38
Trichlorofluoromethane	1.69 J
Heptane	1.15 J
Acetone	47.8 D
Methylene Chloride	5.91
2-Butanone	5.91
Carbon Tetrachloride	0.5
Chloroform	2.2 J
2,2,4-Trimethylpentane	1.54 J
Benzene	7.93
Tetrachloroethylene (PCE)	9.49
Toluene	13.6
Trichloroethylene (TCE)	1.56
Ethyl Benzene	0.78 J
Xylenes (total)	3.78 J
Styrene	0.82 J
1,3,5-Trimethylbenzene	0.54 J
Isopropanol	1.57 J
1,4-Dichlorobenzene	1.56 J
Naphthalene	1.31 J
4-Ethyltoluene	0.49 J
Hexane	8.81

RSS-5	10/08/2019
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.08
Acetone	26.1
Benzene	3.19
Chloroform	14.4
Chloromethane	0.995
Cis-1,2-Dichloroethylene	95.9
Dichlorodifluoromethane	2.8
Ethanol	98.5
Ethylbenzene	8.38
Isopropanol	23.2
m,p-Xylene	9.9
Methyl Ethyl Ketone (2-Butanone)	7.52
N-Heptane	1.67
O-Xylene (1,2-Dimethylbenzene)	1.9
Tert-Butyl Alcohol	3.09
Tetrachloroethylene (PCE)	892
Toluene	5.24
Trans-1,2-Dichloroethene	14.5
Trichloroethylene (TCE)	377
Vinyl Chloride	9.38

RSS-2	10/08/2019
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.85
2,2,4-Trimethylpentane	1.81
Acetone	21
Benzene	0.68
Bromodichloromethane	4.22
Carbon Disulfide	1.31
Chloroform	316
Dichlorodifluoromethane	2.57
Ethanol	196
Ethyl Acetate	5.08
Ethylbenzene	1.85
Isopropanol	22.3
m,p-Xylene	4.78
Methyl Ethyl Ketone (2-Butanone)	6.61
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	2.54
Methylene Chloride	3.13
N-Heptane	1.33
N-Hexane	0.973
O-Xylene (1,2-Dimethylbenzene)	1.94
Tert-Butyl Alcohol	3.18
Tetrachloroethylene (PCE)	266
Tetrahydrofuran	3.07
Toluene	6.97
Trichloroethylene (TCE)	3.74
Trichlorofluoromethane	2.46

RSS-1	10/08/2019
VOCs (µg/m³)	
2,2,4-Trimethylpentane	1650000
Benzene	2440
Cyclohexane	16000
N-Heptane	25900
N-Hexane	182000

RIA-1	10/08/2019
VOCs (µg/m³)	
1,1,1-Trichloroethane (TCA)	0.196
2,2,4-Trimethylpentane	2.7
Acetone	4.09
Benzene	0.776
Carbon Tetrachloride	0.453
Chloromethane	1.04
Dichlorodifluoromethane	1.87
Ethanol	328
Isopropanol	3.37
m,p-Xylene	1.87
N-Heptane	1.73
N-Hexane	1.49
O-Xylene (1,2-Dimethylbenzene)	0.869
Tetrachloroethylene (PCE)	3.16
Toluene	2.43
Trichloroethylene (TCE)	0.14

IA1	12/4/2018
VOCs (µg/m³)	
Dichlorodifluoromethane	1.04 J
Chloromethane	1.57
Trichlorofluoromethane	1.46 J
Heptane	1.68 J
Acetone	52.7 D
Methylene Chloride	8.34
Cyclohexane	0.86 J
2-Butanone	5.9
Carbon Tetrachloride	0.5
cis-1,2-Dichloroethene	0.71 J
Chloroform	0.54 J
2,2,4-Trimethylpentane	1.68 J
Benzene	0.99 J
Tetrachloroethylene (PCE)	21.7
Toluene	37.7
Trichloroethylene (TCE)	2.42
Ethyl Benzene	0.83 J
Xylenes (total)	4.09 J
1,3,5-Trimethylbenzene	0.69 J
1,2,4-Trimethylbenzene	2.26 J
Naphthalene	0.94 J
4-Ethyltoluene	0.84 J
Hexane	21.8 D
Methyl Methacrylate	12.7

SV-1	12/4/2018
VOCs (µg/m³)	
Acetone	131
Carbon Disulfide	9.97 J
Trans-1,2-Dichloroethene	67
2-Butanone	5.6 J
cis-1,2-Dichloroethene	594
Chloroform	11.7 J
Tetrachloroethylene (PCE)	303119 D
Toluene	17 J
Trichloroethylene (TCE)	5911 D
Ethyl Benzene	6.52 J
Xylenes (total)	36.1 J
1,3,5-Trimethylbenzene	6.88 J
1,2,4-Trimethylbenzene	18.7 J
1,4-Dichlorobenzene	0.9 J
4-Ethyltoluene	6.88 J
Hexane	26.4

IA2	12/4/2018
VOCs (µg/m³)	
Dichlorodifluoromethane	0.89 J
Chloromethane	1.38
Trichlorofluoromethane	1.85 J
Heptane	2.38
Acetone	141 D
Carbon Disulfide	0.4 J
Methylene Chloride	6.6
Cyclohexane	1.2 J
2-Butanone	5.6
Carbon Tetrachloride	0.57
cis-1,2-Dichloroethene	2.93
Chloroform	5.86
2,2,4-Trimethylpentane	2.9
Benzene	7.67
Tetrachloroethylene (PCE)	46.8
Toluene	16.2
Trichloroethylene (TCE)	8.06
Ethyl Benzene	1.35 J
Xylenes (total)	6.52 J
Styrene	1.32 J
1,3,5-Trimethylbenzene	1.08 J
1,2,4-Trimethylbenzene	2.9
1,4-Dichlorobenzene	0.9 J
Naphthalene	0.63 J
4-Ethyltoluene	0.88 J
Methyl Methacrylate	1.15 J

SV-2	12/4/2018
VOCs (µg/m³)	
Dichlorodifluoromethane	19.3 J
Chloromethane	3.1 J
Vinyl Chloride	9.46
1,1-Dichloroethane	6.74 J
Acetone	42.8
Carbon Disulfide	12.8 J
Methyl tert-Butyl Ether	16.6 J
trans-1,2-Dichloroethene	369
cis-1,2-Dichloroethene	515
Chloroform	56.6
Benzene	3.83 J
Tetrachloroethylene (PCE)	28480
Toluene	10.9 J
Trichloroethylene (TCE)	3385 D
Xylenes (total)	39.1 J
1,3,5-Trimethylbenzene	7.87 J
1,2,4-Trimethylbenzene	25.6
4-Ethyltoluene	7.37 J
Hexane	14.8 J

RIA-5	10/08/2019
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	3.77
1,3,5-Trimethylbenzene (Mesitylene)	1.22
1,3-Butadiene	1.38
1,4-Dichlorobenzene	1.26
2,2,4-Trimethylpentane	2.69
4-Ethyltoluene	1.72
Acetone	215
Benzene	10.1
Carbon Tetrachloride	0.61
Chloroform	16.4
Chloromethane	1.44
Cis-1,2-Dichloroethylene	0.448
Cyclohexane	1.04
Dichlorodifluoromethane	2.06
Ethanol	347
Ethyl Acetate	12.6
Ethylbenzene	19.6
Isopropanol	64.4
m,p-Xylene	20.5
Methyl Ethyl Ketone (2-Butanone)	26.7
N-Heptane	5.37
N-Hexane	4.79
O-Xylene (1,2-Dimethylbenzene)	3.19
Tetrachloroethylene (PCE)	14.8
Toluene	8.93
Trichloroethylene (TCE)	2.39
Trichlorofluoromethane	1.21

RSS-6	10/08/2019
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.35
2,2,4-Trimethylpentane	1.22
Acetone	24
Benzene	2.71
Carbon Disulfide	1.3
Chloroform	67.9
Cis-1,2-Dichloroethylene	3.68
Dichlorodifluoromethane	5.24
Ethanol	896
Ethyl Acetate	5.05
Ethylbenzene	9.38
Isopropanol	19.3
m,p-Xylene	11.4
Methyl Ethyl Ketone (2-Butanone)	7.28
N-Heptane	2.22
N-Hexane	0.93
O-Xylene (1,2-Dimethylbenzene)	2.11
Tert-Butyl Alcohol	2.59
Tetrachloroethylene (PCE)	208
Toluene	6.37
Trichloroethylene (TCE)	58
Trichlorofluoromethane	1.31

## LEGEND

- MW1 APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL. INSTALLED BY MERRITT ENVIRONMENTAL IN 2019
- IW4 APPROXIMATE LOCATION AND DESIGNATION OF EXISTING INSPECTION AND/OR MONITORING WELL. INSTALLED BY OTHERS
- B1 APPROXIMATE LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY MERRITT ENVIRONMENTAL
- OA-1 APPROXIMATE LOCATION AND DESIGNATION OF OUTDOOR AMBIENT AIR SAMPLE COLLECTED BY MERRITT ENVIRONMENTAL
- IA-4 APPROXIMATE LOCATION OF SOIL VAPOR MONITORING POINT INSTALLED BY MERRITT ENVIRONMENTAL
- IA1 APPROXIMATE LOCATION AND DESIGNATION OF INDOOR AIR AND SUB SLAB SOIL VAPOR SAMPLE LOCATION INSTALLED BY MERRITT ENVIRONMENTAL
- RSS-1/  
RIA-1 APPROXIMATE LOCATION AND DESIGNATION OF ROOF SLAB SOIL VAPOR AND INDOOR AIR SAMPLE COLLECTED BY ROUX
- IA-1 APPROXIMATE LOCATION AND DESIGNATION OF OUTDOOR AMBIENT AIR SAMPLE (ON ROOF OF BUILDING) COLLECTED BY ROUX
- TP-1 APPROXIMATE LOCATION AND DESIGNATION OF EXPLORATORY TEST PIT (ONE FOOT LONG BY ONE FOOT WIDE) INSTALLED BY ROUX
- APPROXIMATE LOCATION OF FORMER DRY CLEANING MACHINE SUPPORT COLUMNS (BASEMENT)

NYSDOH SOIL VAPOR INTRUSION GUIDANCE MATRIX OF MAY 2017				
MATRIX A: CARBON TETRACHLORIDE, TRICHLOROETHENE, CIS-1,2-DICHLOROETHENE, 1,1-DICHLOROETHENE				
SUB-SLAB VAPOR CONCENTRATION	INDOOR AIR CONCENTRATION			ACTION
	< 0.2	0.2 TO < 1	1+	
< 6	NO ACTION	NO ACTION	RESAMPLE OR MITIGATE	
6 TO < 60	NO ACTION	MONITOR	MITIGATE	
60	MITIGATE	MITIGATE	MITIGATE	
MATRIX B: TETRACHLOROETHENE, 1,1,1-TRICHLOROETHENE, METHYLENE CHLORIDE				
SUB-SLAB VAPOR CONCENTRATION	INDOOR AIR CONCENTRATION			ACTION
	< 3	3 TO < 10	10+	
< 100	NO ACTION	NO ACTION	RESAMPLE OR MITIGATE	
100 TO < 1000	NO ACTION	MONITOR	MITIGATE	
1000	MITIGATE	MITIGATE	MITIGATE	
MATRIX C: VINYL CHLORIDE				
SUB-SLAB VAPOR CONCENTRATION	INDOOR AIR CONCENTRATION			ACTION
	< 0.2	0.2+	1+	
< 6	NO ACTION	RESAMPLE OR MITIGATE		
6 TO < 60	MONITOR	MITIGATE		
60	MITIGATE	MITIGATE		

CONCENTRATIONS IN µg/m³

ug/m³ - MICROGRAMS PER CUBIC METER  
NYSDOH - NEW YORK STATE DEPARTMENT OF HEALTH  
VOCs - VOLATILE ORGANIC COMPOUNDS  
D - DILUTION  
DUP - DUPLICATE  
J - ESTIMATED VALUE  
RED DATA - MITIGATE

## NOTES


- OUTDOOR AMBIENT AIR SAMPLE (AA-1) COLLECTED ON ROOF OF BUILDING ADJACENT TO HVAC SYSTEM INTAKE.
- INDOOR AIR SAMPLES (IA-3 AND IA-4) COLLECTED BY MERRITT ENVIRONMENTAL WERE COLLECTED ON THE FIRST FLOOR OF THE ASSOCIATED SUPERMARKET TENANT SPACE (IA-3) AND THE FORMER MARGARITA'S TENANT SPACE (IA-4)

## SOURCE

CONTAMINANT DELINEATION INVESTIGATION, JANUARY 2019 (MERRITT ENVIRONMENTAL CONSULTING CORP.)  
ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY D.C.P., OCTOBER 2019, SUB-SLAB SOIL VAPOR/INDOOR AIR SAMPLING



20' 0 20'

Title:			
SOIL VAPOR AND AIR DETECTIONS			
4125-4149 LACONIA AVENUE BRONX, NEW YORK			
Prepared for:			
LACONIA PROPERTIES LLC			
	Compiled by: J.W.	Date: 18OCT19	PLATE  <b>1</b>
	Prepared by: G.M.	Scale: AS SHOWN	
		Project Mgr: J.W.	Project: 3390.0001Y000
	File: 3390.0001Y102.01.DWG		