



# Interim Remedial Measure Work Plan

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148 and 156 Nagle Avenue  
Manhattan, New York

October 18, 2022

Prepared for:

**Dyckman Crestview Realty, LLC**  
13 Harding Terrace  
Morristown, New Jersey 07960

Prepared by:

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

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1. Conceptual Sub-Slab Depressurization System Plan and Details



# 1. Introduction

At the request of the New York State Department of Environmental Conservation (NYSDEC), Roux Environmental Engineering and Geology, D.P.C. (Roux), has prepared this Interim Remedial Measure (IRM) Work Plan on behalf of Dyckman Crestview Realty, LLC (Dyckman Crestview) for their property located at 148 Nagle Avenue in the Inwood section of New York, New York (Site). The Site entered into the New York State Brownfield Cleanup Program (BCP) in 2018 and was assigned BCP Site No. 231124. Dyckman Crestview is a Participant in the New York State BCP. This IRM Work Plan details the scope of work for the installation of an active sub-slab depressurization system (SSDS) beneath portions of an adjacent existing building located at 156-168 Nagle Avenue, Manhattan, New York (referred to herein as “156 Nagle”).

In December 2021, Roux completed an on-Site and off-Site Pre-Design Investigation (PDI) that identified chlorinated solvents at concentrations that recommend mitigation in accordance with the New York State Department of Health (NYSDOH) decision matrices, which are included in the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 and updated in May 2017 (Appendix A). Details concerning the nature and extent of these concentrations in soil vapor (discussed in Section 2), are shown on Figure 1.

The observed impacts are likely due to releases of dry-cleaning chemicals from the former dry cleaner that occupied one of the tenant spaces at the Site prior to a fire in November 2017. There was onsite storage of liquid tetrachloroethene (PCE) at the former dry cleaner that was released during the fire. According to the Remedial Investigation Report (RIR) dated February 2021 and prepared by Environmental Business Consultants (EBC), the vertical extent of soil contamination within the former dry-cleaning unit extends below the slab to a depth of 25 feet below surface grade (ft bsg). The cellar level of the building was filled in following the fire and subsequent building demolition. Supplemental remediation at the Site will be detailed within a future Remedial Action Work Plan (RAWP).

The IRM scope will address the potential for indoor air contamination at the adjacent 156 Nagle building. Following the implementation of this IRM Work Plan, the need for additional mitigative efforts will be evaluated at 156 Nagle. If additional work is required, it will be incorporated into the future RAWP for New York State Department of Environmental Conservation (NYSDEC) and NYSDOH review and approval.

This IRM 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 complies with all applicable Federal, State and local laws, regulations, and requirements.

## 1.1 Objectives and Scope of the IRM Work Plan

The proposed IRM will retrofit portions of the existing commercial building located at 156 Nagle with an SSDS capable of creating negative pressure under the building slab, and of collecting potentially contaminated vapor for subsequent discharge to the atmosphere above the roof of the 156 Nagle building. This IRM is a component of the overall remediation of the Site and is intended to proactively mitigate off-site soil vapor intrusion issues while the Site undergoes subsequent investigation and remediation. Additional remedial measures will be required at the Site and will be submitted in the RAWP.

The remainder of this IRM 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 Work Plan Implementation Schedule

## 2. Site Background

This section provides relevant background information for the Site.

### 2.1 Site Description and History

Property Location	
Property Name	148 Nagle Site
Property Description	The Site is located on the northwest side of Nagle Avenue, at the intersection of Thayer Street and Nagle Avenue in Inwood (Manhattan), New York. The Site is identified on the New York City Tax Map as Block 2174, Lot 70. The Site consists of an approximate 0.175-acre lot and is currently developed with a one-story, 2000 square foot building. A multi-family residential building (9 Thayer Street) borders the site to the north. Nagle Avenue is to the south beyond which is multifamily residential building (151 Nagle Avenue). Thayer Street borders the site to the west beyond which is developed with a is multifamily residential building (140 Nagle Avenue). Commercial buildings (156 Nagle) border the site to the east.
Property Address	148 Nagle Avenue, Manhattan, New York
Property Town, County, State	Inwood, Manhattan, New York
Property Tax Identification	Block 2174, Lot 70
Nearest Intersection	Thayer Street and Nagle Avenue
Area Description	The area immediately surrounding the Site is a densely developed urban area, consisting primarily of residential and mixed-use (commercial/retail and residential) properties.
Current Site Zoning	Residential and Commercial Use (R7-1 and C1-4)

Property Information – 148 Nagle	
Property Acreage	0.175 acres (total)
Property Shape	Rectangular
Property Use	An existing building at the Site is currently operated as a laundromat. The remainder of the site is now vacant and was formerly occupied by another building with several business, including a former dry cleaner, which was demolished. Access to the Site is restricted by a fence and locked gate.
Number of Buildings	One with one commercial tenant space
Number of Stories	One-story building
Basement/ Slab-on-Grade	Slab-on-grade
Number of Units	1

Property Information – 148 Nagle	
Vehicular Access	None currently; will create access off Nagle Avenue
Other Improvements	Sidewalks, Perimeter Security Fence
Property Coverage	Footprint of the building, sidewalks, exposed soil with some vegetation.

### 2.1.1 Topography/Hydrogeology

The land surface elevation at the Site is approximately 14 feet above mean sea level (ft amsl), according to maps published by the United States Geological Survey (USGS). The Site is underlain by glaciofluvial deposits, which is consistent with the surrounding area, and comprised of sands, silts, clay, gravels, cobbles, and boulders. The topographic gradient of the surrounding area slopes gently downward to the northeast. The depth to groundwater beneath the Site, is approximately 5.86-9.62 ft bsg. Based on measurements made on Site, groundwater flows generally to the north.

## 2.2 Summary of Soil Vapor and Indoor Air Conditions at 156 Nagle

Based upon previous investigations conducted to date, the primary contaminants of concern at the 156 Nagle building include chlorinated volatile organic compounds (CVOCs) in soil vapor and indoor air.

Environmental investigations performed at 156 Nagle include the following:

- Off-Site Soil Vapor Intrusion Investigation, which was completed by EBC in May 2021; and
- Off-Site PDI, which was completed by Roux in December 2021.

A summary of the results is provided below.

### 2.2.1 Off-Site Soil Vapor Intrusion Investigation – May 2021

In accordance with the Off-Site Soil Vapor Intrusion Work Plan (SVIWP) prepared by EBC (dated March 2021), a soil vapor intrusion analysis was performed at 156 Nagle to determine if chlorinated solvent vapor from the 148 Nagle Site (148 Nagle Avenue, New York, NY) was migrating into adjacent residential and community buildings. EBC was only granted access to the two-story commercial building with a basement that is located at 156 Nagle.

EBC conducted an on-site inspection of the building and basement located at 156 Nagle on May 11, 2021, and May 12, 2021. At the time of the inspection, the property was developed with a two-story commercial use building occupied by Rogot Optical, a sports bar, a hardware store, a vacant retail space, convenience store, check cashing business, Kennedy Chicken, and a supermarket on the first floor. The second floor was occupied by a pool hall. The basement level was finished and was divided into three spaces utilized for storage.

On May 11, 2021, EBC collected four sub-slab soil vapor samples from below the basement slab of the building (SS1, SS2, SS3, and SS4), and four indoor (IA1, IA2, IA3, and IA4) air samples from the basement, and one outdoor ambient air sample (OA1).

CVOCs detected within the sub-slab soil vapor samples include trichloroethene (TCE) ranging from 0.53 µg/m<sup>3</sup> to 32,100 µg/m<sup>3</sup>; carbon tetrachloride ranging from 0.38 µg/m<sup>3</sup> to 0.53 µg/m<sup>3</sup>; PCE ranging from 7.05 µg/m<sup>3</sup> to 135,000 µg/m<sup>3</sup>; methylene chloride ranging from 3.65 µg/m<sup>3</sup> to 6.14 µg/m<sup>3</sup>; vinyl chloride

ranging from 0.58 µg/m<sup>3</sup> to 4,340 µg/m<sup>3</sup>; cis-1,2-dichloroethene (cis-1,2-DCE) ranging from 6.6 µg/m<sup>3</sup> to 17,200 µg/m<sup>3</sup>; and 1,1-dichloroethene (1,1-DCE) ranging from 1.52 µg/m<sup>3</sup> to 309 µg/m<sup>3</sup>.

The indoor air ambient samples contained the CVOCs TCE ranging from 0.46 µg/m<sup>3</sup> to 0.53 µg/m<sup>3</sup>; carbon tetrachloride at 0.46 µg/m<sup>3</sup> to 0.5 µg/m<sup>3</sup>; PCE ranging from 4.63 µg/m<sup>3</sup> to 19.5 µg/m<sup>3</sup>; methylene chloride ranging from 4.65 µg/m<sup>3</sup> to 4.96 µg/m<sup>3</sup>; vinyl chloride ranging from 0.68 µg/m<sup>3</sup> to 3.27 µg/m<sup>3</sup>; and cis-1,2-DCE) ranging from 2.15 µg/m<sup>3</sup> to 9.87 µg/m<sup>3</sup>.

The results for the sub-slab and indoor air samples for these compounds were compared to NYSDOH Soil Vapor/Indoor Air Decision Matrix A, Matrix B, and Matrix C. Based on the concentrations of TCE, cis-1,2-DCE, 1,1-DCE, PCE, and vinyl chloride, mitigation was warranted. Additionally, NYSDOH has Air Guideline Values (AGV) for TCE and PCE of 2 µg/m<sup>3</sup> and 30 µg/m<sup>3</sup>, respectively. The indoor air detections for TCE and PCE were below their respective AGVs..

## **2.2.2 Off-Site PDI – December 2021**

Roux prepared an Off-Site Soil Vapor Intrusion Work Plan (SVIWP) (dated October 12, 2021) to confirm the results of the sampling performed by EBC as summarized in EBC's Off-Site Soil Vapor Intrusion Report (Off-Site SVI Report) dated July 6, 2021 (summarized in Section 2.2.1 above) and to collect data adjacent to the other off-site properties of interest. Access was not able to be secured into any of the offsite properties other than 156 Nagle.

### **2.2.2.1 156 Nagle**

During the site reconnaissance visits (June 18, 2021 and September 2, 2021), Roux observed that water (believed to be groundwater) was present immediately below the cellar slab in a sump located in the basement of 156 Nagle. However, at the time of the sampling event on December 8, 2021, the groundwater table was low enough to allow for the collection of sub-slab vapor. Roux recollected the sub-slab soil vapor samples SS3 and SS4 within the cellar of the in the 156 Nagle building at the same locations identified in the EBC Off-Site SVI Report. As the sub-slab soil vapor implants were removed by EBC after their samples were collected, Roux reinstalled the sub-slab soil vapor implants (SS3 and SS4) in the slab of the building. In addition to sub-slab soil vapor samples, two indoor air samples and one ambient air sample were collected.

CVOCs detected within the sub-slab soil gas samples include TCE ranging from 33 µg/m<sup>3</sup> to 120 µg/m<sup>3</sup>; PCE ranging from an estimated 4.4 µg/m<sup>3</sup> to 72 µg/m<sup>3</sup>; methylene chloride in one sample at a detection of an estimated 1.3 µg/m<sup>3</sup>; vinyl chloride ranging from 70 µg/m<sup>3</sup> to 920 µg/m<sup>3</sup>; cis-1,2-DCE ranging from 140 µg/m<sup>3</sup> to 220 µg/m<sup>3</sup>; and 1,1-DCE ranging from 6.5 µg/m<sup>3</sup> to 10 µg/m<sup>3</sup>.

The indoor air ambient samples contained the CVOCs TCE ranging from 0.64 µg/m<sup>3</sup> to 1.2 µg/m<sup>3</sup>, carbon tetrachloride at 0.36 µg/m<sup>3</sup> to 0.38 µg/m<sup>3</sup>, PCE ranging from 11 µg/m<sup>3</sup> to 21 µg/m<sup>3</sup>, methylene chloride ranging from an estimated 1.3 µg/m<sup>3</sup> to an estimated 1.4 µg/m<sup>3</sup>, and cis-1,2-DCE ranging from 1 µg/m<sup>3</sup> to 1.5 µg/m<sup>3</sup>.

The results for the sub-slab and indoor air samples for these compounds were compared to NYSDOH Soil Vapor/Indoor Air Decision Matrix A, Matrix B and Matrix C. Based on the concentrations of TCE, cis-1,2-DCE, PCE<sup>1</sup>, and vinyl chloride, mitigation was warranted. The concentrations of CVOCs in sub-slab vapor detected during the Roux sampling event on December 8, 2021, were orders of magnitude less than the concentrations identified during the sampling event performed by EBC. However, the results of the Roux

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<sup>1</sup> According to Matrix B, the PCE concentrations recommended that the action taken be "Identify source(s) and resample or mitigate."

investigation still indicated that mitigation was required. Additionally, NYSDOH has default indoor air levels for taking immediate and effective action to protect the sensitive populations for TCE and PCE (2  $\mu\text{g}/\text{m}^3$  and 30  $\mu\text{g}/\text{m}^3$ , respectively). The indoor air concentrations of TCE and PCE measured at 156 Nagle continued to be below these levels.

A summary of the CVOCs in soils onsite at 148 Nagle, which are believed to be the source for CVOCs in sub-slab vapor at 156 Nagle is provided on Tables 1 and 2 and on Figure 1. A summary of VOCs in soil vapor, outdoor air, and indoor air is provided on Table 3 and on Figure 2.

### **2.2.2.2 9 Thayer Street, 140 Nagle Avenue, and 151 Nagle Avenue**

In addition to 156 Nagle, three other buildings (9 Thayer Street, 140 Nagle Avenue, and 151 Nagle Avenue) were identified by the NYSDEC as buildings that warranted initial vapor intrusion testing. Two rounds of access request letters have been sent to the owners of 9 Thayer Street, 140 Nagle Avenue, and 151 Nagle Avenue without response.

To get an understanding of the potential soil vapor conditions beneath these three buildings, Roux installed two exterior soil vapor points in the sidewalks in front of each of the three buildings. One ambient air sample was collected outside each of the building simultaneously with the corresponding soil vapor samples in the sidewalk. The ambient air sample was collected using a pre-cleaned 6-liter Summa canister with regulators calibrated to collect the sample over an 8-hour interval.

CVOCs detected within the soil vapor samples include carbon tetrachloride ranging from an estimated 0.2  $\mu\text{g}/\text{m}^3$  to 0.31  $\mu\text{g}/\text{m}^3$ , methylene chloride ranging from an estimated 0.72  $\mu\text{g}/\text{m}^3$  to an estimated 1.5  $\mu\text{g}/\text{m}^3$ , and PCE ranging from an estimated 0.44  $\mu\text{g}/\text{m}^3$  to 3  $\mu\text{g}/\text{m}^3$ .

The outdoor air ambient samples contained the CVOCs carbon tetrachloride ranging from 0.33  $\mu\text{g}/\text{m}^3$  to 0.42  $\mu\text{g}/\text{m}^3$  and methylene chloride ranging from an estimated 0.85  $\mu\text{g}/\text{m}^3$  to an estimated 1.4  $\mu\text{g}/\text{m}^3$ .

A summary of VOCs in soil vapor, outdoor air, and indoor air is provided on Table 3 and on Figure 2. No indoor air samples were collected as part of the Off-Site PDI; therefore, no direct comparison is made to the NYSDOH Matrices. However, concentrations of the CVOCs detected in soil vapor were not elevated, so the data supports the conclusion that the impacted soil vapor from the Site has not migrated beneath the off-site buildings located at 9 Thayer Street, 140 Nagle Avenue, and 151 Nagle Avenue. No further investigation of these off-site properties is warranted.

## 3. Scope of Work

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

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

Implementation of the IRM will be in accordance with the Soils/Materials Management Plan (SoMP) included in Section 4 of this IRM Work Plan.

### 3.1 Mobilization and Site Preparation

A project kick-off meeting will be conducted with the NYSDEC, Dyckman Crestview, Roux, and the selected Contractor prior to the commencement of any intrusive activities. 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;
4. Installation of header piping and roof leaders;
5. Installation of in-line fan; and
6. Demobilization of equipment.

### 3.2 SSDS Installation

Sub-slab soil vapor samples collected during the 2021 PDI detected elevated concentrations of CVOCs beneath the slab at 156 Nagle; therefore, an active SSDS is proposed to be installed beneath the western portion of the 156 Nagle building shown on Drawing 1 to address potential exposure pathways. The installation of the active SSDS, as shown on Drawing 1, is designed to depressurize the portion of the slab beneath the westernmost tenant space of the 156 Nagle building. The proposed active SSDS will include vertical polyvinyl chloride (PVC) suction points at two locations. The testing of the SSDS will be completed following installation.

The SSDS will be installed in the westernmost unit within the southern building that improves Lot 66 in Block 2174 on the New York City Tax Map. The basement in 156 Nagle is separated from the basements in the other units with a wall.

The active SSDS for 156 Nagle, when complete, will consist of a network of two vertical suction points fitted with an in-line fan that will create a vacuum influence beneath the 156 Nagle portion of the building's

basement slab shown on Drawing 1. The SSDS plan design and piping details are provided in Drawing 1. A description of the proposed active SSDS is provided below.

- All existing interior utility, slab penetrations and other cracks will be sealed with silicone caulking, to the extent feasible. If any major repairs are required (such as full slab replacement), they will be incorporated into the future RAWP.
- Two vertical suction points will be installed to create the required vacuum influence below the basement slab of the 156 Nagle building. All suction points will consist of 4-inch PVC piping below the slab and steel above the slab (Drawing 1).
- 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 exterior of the building. The header will be connected to a vacuum fan on the outside wall of the building. An adequately sized in-line fan will be provided for the suction points. Drawing 1 shows suction points and piping associated with the SSDS. Fan and piping headers will be located on the side of the building, 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.
- Extracted vapor evaluation:
  - A Division of Air Resources (DAR 1) screening analysis was performed for selected compounds identified in the sub-slab soil vapor samples to determine if the estimated emissions from the operation of the active SSDS would exceed the permissible limits in accordance with the “Guidance on Air Emissions of VOCs at DER Remediation Sites” developed by DER and DAR. Appendix B presents the DAR 1 screening level worksheet for the evaluation of certain VOCs that were identified as the constituents of concern for the evaluation based on the relatively high concentrations observed in the sub-slab soil vapor samples and the low guidance concentrations (i.e., allowable discharge limits). The DAR 1 evaluation was employed using the contaminant emission rate (pounds per hour) based on the sub-slab vapor samples collected in September 2021. The emission impacts were compared to the High Toxicity Air Contaminants (HTAC) List. Based on the DAR 1 analysis, the estimated contaminant emission rates are below the HTAC and non-HTAC limits and, therefore, vapor treatment is not required prior to discharge. This will be confirmed during SSDS start-up testing, as described in Section 3.3.
- The vacuum in-line fan will be installed on the side of the building. The discharge point will be located on the roof with a minimum of 10 ft from any HVAC air inlets and the building edge.
- The vacuum fan will be installed with an alarm system that includes a low vacuum switch to alert the building manager of any issues. The alarm should be placed in a location that will be noticed by the building manager.
- Four sub-slab soil vapor monitoring points (SS-A through SS-D) will be used to monitor the performance of the SSDS in the building. The monitoring points are installed approximately where shown on Drawing 1. Vacuum measurements from these four monitoring points will be used to determine if the SSDS is functioning as designed and depressurizing the slabs under the westernmost tenant space bordering the Site. If more monitoring points are required to make this determination, they will be installed during the SSDS installation on an as-needed basis.
- Two low pressure vacuum switches with audible and visual alarms will be installed to monitor the function of each suction point by measuring the presence of operating vacuum within each suction point pipe riser.
- Each of the two vacuum switches will be installed in each of the corresponding pipe risers, and the alarm panel will be mounted in the interior of the building.

### 3.3 SSDS Startup and Testing

Performance monitoring will be performed on the SSDS as part of the SSDS start-up to verify the system is operating properly and will consist of the following:

- Confirm operation of the local alarm warning light and remote alarm;
- Confirm acceptable air flow rate from the SSDS in-line fan by a visual inspection of gauges affixed to the system;
- Confirm acceptable negative pressure readings from the SSDS and suction points by a visual inspection of gauges to the fan and each suction point;
- Confirm acceptable negative differential pressure (a minimum of -0.004 inches of water column) beneath the building at the four monitoring points (SS-A through SS-D) by using an appropriate micromanometer;
- Collect photoionization detector (PID) readings;
- Collect a confirmation effluent air sample; and
- Collect indoor air, sub-slab vapor, and ambient air samples.

Negative differential pressure measurements will be collected from the four soil vapor monitoring points (SS-A through SS-D) shown on SSDS Drawing 1 to determine if the slab under the westernmost tenant space in the 156 Nagle building is depressurized. The negative pressure measurements will be collected using a micromanometer capable of monitoring differential pressure at a minimum of 0.001 inches of water column. If adequate depressurization (e.g., negative differential pressure of at least -0.004 inches of water column) is not occurring, the cause for the lack of depressurization will be investigated and repaired, and measurements will be collected again.

Following the initial start-up, performance monitoring of the SSDS will also 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 the fan using a Summa canister and analyzed using USEPA TO-15 to verify that vapor treatment is 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 required, appropriate treatment options will be evaluated and installed.

Additionally, 30-days following initial start-up, six indoor air samples (IA3 through IA8), three sub-slab samples (SS-E through SS-G [the three sub-slab vapor points in the area of the building where the slab is not depressurized by the SSDS]), and one ambient air sample will be collected and analysed using USEPA Method TO-15 to verify that the SSDS is effectively reducing vapor intrusion across the entire footprint of the building. It is preferable that this sampling occur during the heating season to evaluate the worst-case scenarios. Following the initial sampling event, this monitoring will occur on a semi-annual basis. All samples will be collected in accordance with the Site's Quality Assurance Project Plan (QAPP), which is included as Appendix C. Roux will evaluate the results of this indoor air testing to both the results of the ambient air sample and the NYSDOH matrices to determine if the indoor air concentrations are within background conditions.

The system testing described above (excluding effluent air sampling) will also be conducted if, during 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.

### **3.4 SSDS Operation, Maintenance and Monitoring (OM &M)**

OM & M procedures for the SSDS will be included in the Interim Site Management Plan (SMP) for the Site, which will be included in the IRM Construction Completion Report but are outlined herein for the period prior to the approval of the Interim SMP.

#### **3.4.1 System Operation: Routine Operation Procedures**

Routine operation procedures will consist of monitoring the vacuum SSDS and recording sub-slab vacuum measurements.

#### **3.4.2 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 fan 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 fan. 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 control panel and warning lights/alarms and remote alarm;
- Inspect fan piping and valves; 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. Any maintenance completed for the SSDS should be documented in the SSDS Operations and Maintenance Log included as Appendix D.

#### **3.4.3 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:

- Inspect and test local and remote alarms;
- Replacement of vacuum/pressure gauges; and
- Replacement of in-line fan.

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

During the SSDS installation, the riser pipe and header piping will be pitched such that any condensate within the system will drain back to the SSDS pits. It is anticipated that there will not be accumulated condensate that would need to be containerized and then disposed of off-Site. Manufacturer's recommendations for SSDS component maintenance should be followed. Any maintenance completed for the SSDS should be documented in the SSDS Operations and Maintenance Log included as Appendix D.

In the event that low SSDS air flow rates or vacuum are observed anywhere in the SSDS, further SSDS balancing may be necessary following moisture removal, to ensure that the combined air flow rates and vacuum in a given area of the Site achieve the minimum design requirements.

### **3.5 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 the results of previous soil samples collected at the Site, soil containing elevated concentration of CVOCs is not anticipated to be encountered in the area where the SSDS will be installed 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.

### **3.6 Documentation**

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

## 4. 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.

### 4.1 Soil Screening Methods

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

### 4.2 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.

### 4.3 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.

### 4.4 Materials Excavation and Load Out

Roux will oversee all intrusive 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.

Dyckman Crestview and its contractors are solely responsible for safe execution of all intrusive and other work performed under this SoMP. Support of excavation, though unlikely due to the nature of the work, will be provided, if necessary, based upon Site conditions and local regulations.

### 4.5 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 intrusive Site work will be promptly communicated by phone to NYSDEC Project Manager. These findings will also be included in weekly and periodic electronic reports.

## 4.6 Community Air Monitoring Plan (CAMP)

A CAMP will be implemented, in accordance with the procedures outlined in the CAMP (Appendix F), during all intrusive activities to minimize the potential for tenant exposure from potentially contaminated soil and soil vapor. The CAMP is being utilized due to activities occurring inside the building. Roux will provide ambient air quality monitoring for VOCs and particulates during all intrusive Site activities. CAMP monitoring data will be included in daily reports (see Section 5.1). Action level exceedances will be reported to NYSDEC's 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.

## 4.7 Odor, Dust, and Nuisance Control Plan

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

### 4.7.1 Odor Control Plan

In addition to the health and safety monitoring described in the HASP (Appendix E), Roux will closely monitor the presence of odors emanating from the work area within the building. 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 CCR 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.

### 4.7.2 Dust Control Plan

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

### 4.7.3 Other Nuisances

Noise controls will be exercised during the remedial program.

## **5. Reporting**

### **5.1 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.

### **5.2 Construction Completion Report (CCR)**

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 CCR. The Interim SMP will be included as an appendix to the CCR. The CCR will be submitted within 60 days after the data usability summary report (DUSR) is complete for any vapor samples collected during the SSDS start-up.

## 6. IRM Implementation Schedule

This IRM Work Plan is anticipated to begin in the third quarter of 2022, pending access to the adjacent property, and will require approximately six to eight weeks to complete. Currently, we have access to the neighboring site. It is anticipated the actual on-Site duration of major remedial construction tasks will be completed as follows (time frames are not necessarily consecutive):

- Site Mobilization and Preparation ..... one day
- SSDS Installation ..... one week
- SSDS Startup and Testing ..... two days
- Transportation and Off-Site Disposal ..... one day
- Site Restoration and Demobilization ..... one day
- Submittal of CCR After Startup and Testing Completed ..... 60 days

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**TABLES**

1. Summary of Volatile Organic Compounds in Soil
2. Summary of TCLP Volatile Organic Compounds in Soil
3. Summary of Volatile Organic Compounds in Soil Vapor, Indoor Air and Ambient Air

## Notes Utilized Throughout Tables

### Soil Tables

J - Estimated value

U - Indicates that the compound was analyzed for but not detected

T - Indicates that a quality control parameter has exceeded laboratory limits

ft bls - Feet below land surface

FD - Duplicate sample

mg/kg - Milligrams per kilogram

NYSDEC - New York State Department of Environmental Conservation

SCO - Soil Cleanup Objectives

-- No SCO available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO

Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO

### TCLP Tables

mg/L - Milligrams per liter

USEPA - United States Environmental Protection Agency

TCLP - Toxicity Characteristic Leaching Procedure

USEPA Regulatory Levels - United States Environmental Protection

Agency Limits for RCRA Characteristic Waste for Toxicity

RCRA - Resource Conservation and Recovery Act

Bold - Parameter was detected above USEPA Regulatory Levels

### Soil Vapor/Ambient Air

J - Estimated value

U - Indicates that the compound was analyzed for but not detected

T - Indicates that a quality control parameter has exceeded laboratory limits

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte

ug/m3 - Micrograms per cubic meter

Bold data indicates that parameter was detected

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_E_10	19SB1_E_10	19SB1_E_20	19SB1_E_20	19SB1_N_10
				Sample Date:	09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/02/2021
				Sample Depth (ft bls):	15 - 17	21 - 23	15 - 17	21 - 23	11 - 13
				Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,1,2,2-Tetrachloroethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,1,2-Trichloroethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,1-Dichloroethane	26	0.27	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,1-Dichloroethene	100	0.33	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2,3-Trichlorobenzene	--	--	MG/KG	0.24 U	0.15 UT	0.0015 U	0.001 U	0.16 UT	
1,2,4-Trichlorobenzene	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2-Dibromo-3-Chloropropane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2-Dibromoethane (Ethylene Dibromide)	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2-Dichlorobenzene	100	1.1	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2-Dichloroethane	3.1	0.02	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,2-Dichloropropane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,3-Dichlorobenzene	49	2.4	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
1,4-Dichlorobenzene	13	1.8	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
2-Hexanone	--	--	MG/KG	1.2 U	0.76 U	0.0076 U	0.005 U	0.82 U	
Acetone	100	0.05	MG/KG	1.2 U	0.76 U	0.054 T	0.0061 U	0.82 U	
Benzene	4.8	0.06	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Bromochloromethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Bromodichloromethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Bromoform	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Bromomethane	--	--	MG/KG	0.24 U	0.15 U	0.003 U	0.002 U	0.16 U	
Carbon Disulfide	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.0043	0.16 U	
Carbon Tetrachloride	2.4	0.76	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Chlorobenzene	100	1.1	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Chloroethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Chloroform	49	0.37	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Chloromethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	3.3	1.3	0.0015 U	0.001 U	4.4	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_E_10	19SB1_E_10	19SB1_E_20	19SB1_E_20	19SB1_N_10
				Sample Date:	09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/02/2021
				Sample Depth (ft bls):	15 - 17	21 - 23	15 - 17	21 - 23	11 - 13
				Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
Cis-1,3-Dichloropropene	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Cyclohexane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Dibromochloromethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Dichlorodifluoromethane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Ethylbenzene	41	1	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Isopropylbenzene (Cumene)	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
m,p-Xylene	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Methyl Acetate	--	--	MG/KG	0.33 J	0.12 J	0.0076 U	0.005 U	0.28 J	
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	1.2 U	0.76 U	0.0052 J	0.0084	0.82 U	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	MG/KG	1.2 U	0.76 U	0.0076 U	0.005 U	0.82 U	
Methylcyclohexane	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Methylene Chloride	100	0.05	MG/KG	0.24 U	0.15 U	0.003 U	0.002 U	0.16 U	
N-Butylbenzene	100	12	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
N-Propylbenzene	100	3.9	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
O-Xylene (1,2-Dimethylbenzene)	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Sec-Butylbenzene	100	11	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Styrene	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
T-Butylbenzene	100	5.9	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Tetrachloroethylene (PCE)	<b>19</b>	<b>1.3</b>	MG/KG	<b>50</b>	<b>2.2</b>	0.00056 J	0.0019	<b>18</b>	
Toluene	100	0.7	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.083 J	0.075 J	0.0015 U	0.001 U	0.14 J	
Trans-1,3-Dichloropropene	--	--	MG/KG	0.24 U	0.15 U	0.0015 U	0.001 U	0.16 U	
Trichloroethylene (TCE)	<b>21</b>	<b>0.47</b>	MG/KG	<b>0.81</b>	<b>0.19</b>	0.0015 U	0.001 U	<b>2</b>	
Trichlorofluoromethane	--	--	MG/KG	0.24 UT	0.15 U	0.0015 U	0.001 U	0.16 U	
Vinyl Chloride	<b>0.9</b>	<b>0.02</b>	MG/KG	<b>0.1 J</b>	<b>0.17</b>	0.0015 U	0.001 U	<b>0.19</b>	
Xylenes	100	1.6	MG/KG	0.48 U	0.3 U	0.003 U	0.002 U	0.33 U	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_N_10	19SB1_N_20	19SB1_N_20	19SB1_N_20	19SB1_W_10
				Sample Date:	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
				Sample Depth (ft bls):	15 - 17	12 - 14	17 - 19	23 - 25	10 - 12
				Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,1,2,2-Tetrachloroethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,1,2-Trichloroethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,1-Dichloroethane	26	0.27	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,1-Dichloroethene	100	0.33	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,2,3-Trichlorobenzene	--	--	MG/KG	0.11 U	0.0012 U	0.12 UT	0.13 UT	4.9 UT	
1,2,4-Trichlorobenzene	--	--	MG/KG	0.11 U	0.0012 U	0.12 UT	0.13 UT	4.9 U	
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,2-Dibromo-3-Chloropropane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,2-Dibromoethane (Ethylene Dibromide)	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,2-Dichlorobenzene	100	1.1	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,2-Dichloroethane	3.1	0.02	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,2-Dichloropropane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,3-Dichlorobenzene	49	2.4	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
1,4-Dichlorobenzene	13	1.8	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
2-Hexanone	--	--	MG/KG	0.54 U	0.0058 U	0.58 U	0.67 U	25 U	
Acetone	100	0.05	MG/KG	0.54 U	0.034	0.58 U	0.67 U	25 U	
Benzene	4.8	0.06	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Bromochloromethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Bromodichloromethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Bromoform	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Bromomethane	--	--	MG/KG	0.11 U	0.0023 U	0.12 U	0.13 U	4.9 U	
Carbon Disulfide	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Carbon Tetrachloride	2.4	0.76	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Chlorobenzene	100	1.1	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Chloroethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Chloroform	49	0.37	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Chloromethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U	
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	2.8	0.0012 U	5.1	3.5	68	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation: <b>19SB1_N_10</b> <b>19SB1_N_20</b> <b>19SB1_N_20</b> <b>19SB1_N_20</b> <b>19SB1_W_10</b>				
				Sample Date: <b>09/02/2021</b> <b>09/02/2021</b> <b>09/02/2021</b> <b>09/02/2021</b> <b>09/02/2021</b>				
				Sample Depth (ft bls): <b>15 - 17</b> <b>12 - 14</b> <b>17 - 19</b> <b>23 - 25</b> <b>10 - 12</b>				
				Normal Sample or Field Duplicate: <b>N</b> <b>N</b> <b>N</b> <b>N</b> <b>N</b>				
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units					
Cis-1,3-Dichloropropene	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Cyclohexane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Dibromochloromethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Dichlorodifluoromethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Ethylbenzene	41	1	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Isopropylbenzene (Cumene)	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
m,p-Xylene	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Methyl Acetate	--	--	MG/KG	0.54 U	0.0058 U	0.58 U	0.22 J	25 U
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	0.54 U	0.0096	0.58 U	0.67 U	25 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	MG/KG	0.54 U	0.0058 U	0.58 U	0.67 U	25 U
Methylcyclohexane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Methylene Chloride	100	0.05	MG/KG	0.11 U	0.0023 U	0.12 U	0.13 U	4.9 U
N-Butylbenzene	100	12	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
N-Propylbenzene	100	3.9	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
O-Xylene (1,2-Dimethylbenzene)	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Sec-Butylbenzene	100	11	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Styrene	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
T-Butylbenzene	100	5.9	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Tetrachloroethylene (PCE)	<b>19</b>	<b>1.3</b>	MG/KG	0.11 U	0.00085 J	<b>2.9</b>	<b>3.3</b>	<b>1400</b>
Toluene	100	0.7	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Trans-1,3-Dichloropropene	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Trichloroethylene (TCE)	<b>21</b>	<b>0.47</b>	MG/KG	0.11 U	0.0012 U	<b>2</b>	<b>2</b>	<b>34</b>
Trichlorofluoromethane	--	--	MG/KG	0.11 U	0.0012 U	0.12 U	0.13 U	4.9 U
Vinyl Chloride	<b>0.9</b>	<b>0.02</b>	MG/KG	<b>0.68</b>	0.0012 U	<b>0.89</b>	<b>0.057 J</b>	<b>4.4 J</b>
Xylenes	100	1.6	MG/KG	0.21 U	0.0023 U	0.23 U	0.27 U	9.8 U

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_W_10	19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_W_20
				Sample Date:	09/02/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021
				Sample Depth (ft bls):	21 - 23	10 - 12	15 - 17	15 - 17	17 - 19
				Normal Sample or Field Duplicate:	N	N	N	FD	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,1,2,2-Tetrachloroethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,1,2-Trichloroethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,1-Dichloroethane	26	0.27	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,1-Dichloroethene	100	0.33	MG/KG	0.073 J	130 U	0.23 U	0.46 U	0.19 U	
1,2,3-Trichlorobenzene	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
1,2,4-Trichlorobenzene	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,2-Dibromo-3-Chloropropane	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
1,2-Dibromoethane (Ethylene Dibromide)	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,2-Dichlorobenzene	100	1.1	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
1,2-Dichloroethane	3.1	0.02	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,2-Dichloropropane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
1,3-Dichlorobenzene	49	2.4	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
1,4-Dichlorobenzene	13	1.8	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
2-Hexanone	--	--	MG/KG	1.1 UT	650 U	1.2 U	2.3 U	0.93 U	
Acetone	100	0.05	MG/KG	1.1 U	650 U	1.2 U	2.3 U	0.93 U	
Benzene	4.8	0.06	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Bromochloromethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Bromodichloromethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Bromoform	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Bromomethane	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Carbon Disulfide	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Carbon Tetrachloride	2.4	0.76	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Chlorobenzene	100	1.1	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Chloroethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Chloroform	49	0.37	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Chloromethane	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	4.3 T	430	4.5	7.7	0.47	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_W_10	19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_W_20
				Sample Date:	09/02/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021
				Sample Depth (ft bls):	21 - 23	10 - 12	15 - 17	15 - 17	17 - 19
				Normal Sample or Field Duplicate:	N	N	N	FD	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
Cis-1,3-Dichloropropene	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Cyclohexane	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Dibromochloromethane	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Dichlorodifluoromethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Ethylbenzene	41	1	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Isopropylbenzene (Cumene)	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
m,p-Xylene	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Methyl Acetate	--	--	MG/KG	1.1 U	650 U	1.2 U	2.3 U	0.93 U	
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	1.1 U	650 U	1.2 U	2.3 U	0.93 U	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	MG/KG	1.1 U	650 U	1.2 U	2.3 U	0.93 U	
Methylcyclohexane	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Methylene Chloride	100	0.05	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
N-Butylbenzene	100	12	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
N-Propylbenzene	100	3.9	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
O-Xylene (1,2-Dimethylbenzene)	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Sec-Butylbenzene	100	11	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Styrene	--	--	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
T-Butylbenzene	100	5.9	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.21 UT	130 U	0.23 U	0.46 U	0.19 U	
Tetrachloroethylene (PCE)	<b>19</b>	<b>1.3</b>	MG/KG	<b>89</b>	<b>30000</b>	<b>83</b>	<b>120</b>	<b>54</b>	
Toluene	100	0.7	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Trans-1,3-Dichloropropene	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Trichloroethylene (TCE)	<b>21</b>	<b>0.47</b>	MG/KG	<b>2.8 T</b>	<b>210</b>	<b>1.7</b>	<b>2.2</b>	<b>0.62</b>	
Trichlorofluoromethane	--	--	MG/KG	0.21 U	130 U	0.23 U	0.46 U	0.19 U	
Vinyl Chloride	<b>0.9</b>	<b>0.02</b>	MG/KG	<b>0.22</b>	<b>130 U</b>	<b>0.39</b>	<b>0.64</b>	<b>0.068 J</b>	
Xylenes	100	1.6	MG/KG	0.43 U	260 U	0.47 U	0.93 U	0.37 U	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_NW_20	19SB1_W_35
				Sample Date:	09/03/2021	09/03/2021	09/03/2021	12/06/2021	12/06/2021
				Sample Depth (ft bls):	19 - 21	21 - 23	23 - 25	10 - 12	12 - 14
				Normal Sample or Field Duplicate:	N	N	N	N	INITIAL
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,1,2,2-Tetrachloroethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,1,2-Trichloroethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,1-Dichloroethane	26	0.27	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,1-Dichloroethene	100	0.33	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.0085	
1,2,3-Trichlorobenzene	--	--	MG/KG	2.7 U	1 UT	0.12 UT	0.0012 U	0.00044 J	
1,2,4-Trichlorobenzene	--	--	MG/KG	2.7 U	1 U	0.12 UT	NA	NA	
1,2,4-Trimethylbenzene	52	3.6	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,2-Dibromo-3-Chloropropane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,2-Dibromoethane (Ethylene Dibromide)	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,2-Dichlorobenzene	100	1.1	MG/KG	2.7 U	1 U	0.12 U	NA	NA	
1,2-Dichloroethane	3.1	0.02	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,2-Dichloropropane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
1,3-Dichlorobenzene	49	2.4	MG/KG	2.7 U	1 U	0.12 U	NA	NA	
1,4-Dichlorobenzene	13	1.8	MG/KG	2.7 U	1 U	0.12 U	NA	NA	
2-Hexanone	--	--	MG/KG	13 U	5 U	0.59 U	0.0061 U	0.004 UT	
Acetone	100	0.05	MG/KG	13 U	5 U	0.59 U	0.083	0.041	
Benzene	4.8	0.06	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.0012	
Bromochloromethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Bromodichloromethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Bromoform	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Bromomethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0025 U	0.0016 U	
Carbon Disulfide	--	--	MG/KG	2.7 U	1 U	0.12 U	0.00092 JT	0.0059	
Carbon Tetrachloride	2.4	0.76	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Chlorobenzene	100	1.1	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Chloroethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Chloroform	49	0.37	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Chloromethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	12	1.2	0.093 J	0.0049	NA	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_NW_20	19SB1_W_35
				Sample Date:	09/03/2021	09/03/2021	09/03/2021	12/06/2021	12/06/2021
				Sample Depth (ft bls):	19 - 21	21 - 23	23 - 25	10 - 12	12 - 14
				Normal Sample or Field Duplicate:	N	N	N	N	INITIAL
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
Cis-1,3-Dichloropropene	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Cyclohexane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Dibromochloromethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Dichlorodifluoromethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Ethylbenzene	41	1	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Isopropylbenzene (Cumene)	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
m,p-Xylene	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Methyl Acetate	--	--	MG/KG	13 U	5 U	0.59 U	0.0061 U	0.004 U	
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	13 U	5 U	0.59 U	0.015	0.004 U	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	MG/KG	13 U	5 U	0.59 U	0.0061 U	0.004 UT	
Methylcyclohexane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Methylene Chloride	100	0.05	MG/KG	2.7 U	1 U	0.12 U	0.0025 U	0.0016 U	
N-Butylbenzene	100	12	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
N-Propylbenzene	100	3.9	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
O-Xylene (1,2-Dimethylbenzene)	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Sec-Butylbenzene	100	11	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Styrene	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
T-Butylbenzene	100	5.9	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Tert-Butyl Methyl Ether	100	0.93	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Tetrachloroethylene (PCE)	<b>19</b>	<b>1.3</b>	MG/KG	<b>540</b>	<b>230</b>	<b>8.2</b>	0.0012 U	0.001	
Toluene	100	0.7	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00058 J	
Trans-1,2-Dichloroethene	100	0.19	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.0066	
Trans-1,3-Dichloropropene	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Trichloroethylene (TCE)	<b>21</b>	<b>0.47</b>	MG/KG	<b>3.4</b>	<b>1</b>	0.082 J	0.0012 U	0.0035 T	
Trichlorofluoromethane	--	--	MG/KG	2.7 U	1 U	0.12 U	0.0012 U	0.00079 U	
Vinyl Chloride	<b>0.9</b>	<b>0.02</b>	MG/KG	<b>0.61 J</b>	1 U	0.12 U	<b>0.027</b>	NA	
Xylenes	100	1.6	MG/KG	5.3 U	2 U	0.24 U	0.0025 U	0.0016 U	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_W_35	19SB1_W_35	19SB1_W_50
				Sample Date:	12/06/2021	12/06/2021	12/06/2021
				Sample Depth (ft bls):	12 - 14	15 - 17	10 - 12
				Normal Sample or Field Duplicate:	REANALYSIS	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units				
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.098 U	0.11 U	0.0012 U	
1,1,2,2-Tetrachloroethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,1,2-Trichloro-1,2,2-Trifluoroethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,1,2-Trichloroethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,1-Dichloroethane	26	0.27	MG/KG	0.098 U	0.11 U	0.0012 U	
1,1-Dichloroethene	100	0.33	MG/KG	0.098 U	0.11 U	0.0012 U	
1,2,3-Trichlorobenzene	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,2,4-Trichlorobenzene	--	--	MG/KG	0.098 U	0.11 U	NA	
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.098 U	0.11 U	0.0012 U	
1,2-Dibromo-3-Chloropropane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,2-Dibromoethane (Ethylene Dibromide)	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,2-Dichlorobenzene	100	1.1	MG/KG	0.098 U	0.11 U	NA	
1,2-Dichloroethane	3.1	0.02	MG/KG	0.098 U	0.11 U	0.0012 U	
1,2-Dichloropropane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.098 U	0.11 U	0.0012 U	
1,3-Dichlorobenzene	49	2.4	MG/KG	0.098 U	0.11 U	NA	
1,4-Dichlorobenzene	13	1.8	MG/KG	0.098 U	0.11 U	NA	
2-Hexanone	--	--	MG/KG	0.49 U	0.56 U	0.0062 U	
Acetone	100	0.05	MG/KG	0.49 U	0.56 U	0.17	
Benzene	4.8	0.06	MG/KG	0.098 UT	0.11 U	0.0012 U	
Bromochloromethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Bromodichloromethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Bromoform	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Bromomethane	--	--	MG/KG	0.098 U	0.11 U	0.0025 U	
Carbon Disulfide	--	--	MG/KG	0.098 U	0.11 U	0.0011 JT	
Carbon Tetrachloride	2.4	0.76	MG/KG	0.098 U	0.11 U	0.0012 U	
Chlorobenzene	100	1.1	MG/KG	0.098 U	0.11 U	0.0012 U	
Chloroethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Chloroform	49	0.37	MG/KG	0.098 U	0.11 U	0.0012 U	
Chloromethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	0.76	0.64	0.0068	

**Table 1. Summary of Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

				Sample Designation:	19SB1_W_35	19SB1_W_35	19SB1_W_50
				Sample Date:	12/06/2021	12/06/2021	12/06/2021
				Sample Depth (ft bls):	12 - 14	15 - 17	10 - 12
				Normal Sample or Field Duplicate:	REANALYSIS	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units				
Cis-1,3-Dichloropropene	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Cyclohexane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Dibromochloromethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Dichlorodifluoromethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Ethylbenzene	41	1	MG/KG	0.098 U	0.11 U	0.0012 U	
Isopropylbenzene (Cumene)	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
m,p-Xylene	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Methyl Acetate	--	--	MG/KG	0.49 U	0.56 U	0.0062 U	
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	0.49 U	0.56 U	0.036	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	--	MG/KG	0.49 U	0.56 U	0.0062 U	
Methylcyclohexane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Methylene Chloride	100	0.05	MG/KG	0.098 U	0.11 U	0.0025 U	
N-Butylbenzene	100	12	MG/KG	0.098 UT	0.11 U	0.0012 U	
N-Propylbenzene	100	3.9	MG/KG	0.098 UT	0.11 U	0.0012 U	
O-Xylene (1,2-Dimethylbenzene)	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Sec-Butylbenzene	100	11	MG/KG	0.098 U	0.11 U	0.0012 U	
Styrene	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
T-Butylbenzene	100	5.9	MG/KG	0.098 U	0.11 U	0.0012 U	
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.098 U	0.11 U	0.0012 U	
Tetrachloroethylene (PCE)	<b>19</b>	<b>1.3</b>	MG/KG	0.098 U	0.33	0.0027	
Toluene	100	0.7	MG/KG	0.098 U	0.11 U	0.0012 U	
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.098 U	0.11 U	0.0012 U	
Trans-1,3-Dichloropropene	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Trichloroethylene (TCE)	<b>21</b>	<b>0.47</b>	MG/KG	0.098 U	0.3	0.0011 J	
Trichlorofluoromethane	--	--	MG/KG	0.098 U	0.11 U	0.0012 U	
Vinyl Chloride	<b>0.9</b>	<b>0.02</b>	MG/KG	<b>0.14</b>	0.11 U	<b>0.067</b>	
Xylenes	100	1.6	MG/KG	0.2 U	0.22 U	0.0025 U	

**Table 2. Summary of TCLP Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

			19SB1_E_10	19SB1_E_10	19SB1_E_20	19SB1_E_20	19SB1_N_10	19SB1_N_10
Sample Designation:			19SB1_E_10	19SB1_E_10	19SB1_E_20	19SB1_E_20	19SB1_N_10	19SB1_N_10
Sample Date:			09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/02/2021	09/02/2021
Sample Depth (ft bls):			15 - 17	21 - 23	15 - 17	21 - 23	11 - 13	15 - 17
Normal Sample or Field Duplicate:			N	N	N	N	N	N
Parameter	USEPA Regulatory Levels (mg/L)	Units						
1,1-Dichloroethene	0.7	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,2-Dichloroethane	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1,4-Dichlorobenzene	7.5	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Benzene	0.5	MG/L	0.01 U	0.0056 J	0.01 U	0.01 U	0.01 U	0.01 U
Carbon Tetrachloride	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chlorobenzene	100	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chloroform	6	MG/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Methyl Ethyl Ketone (2-Butanone)	200	MG/L	0.05 UT	0.05 UT	0.05 UT	0.05 UT	0.05 UT	0.05 UT
Tetrachloroethylene (PCE)	<b>0.7</b>	MG/L	<b>0.72</b>	0.024	0.01 U	0.01 U	0.017	0.01 U
Trichloroethylene (TCE)	<b>0.5</b>	MG/L	0.017	0.01 U	0.01 U	0.01 U	0.0041 J	0.01 U
Vinyl Chloride	0.2	MG/L	0.0087 J	0.01 U				

**Table 2. Summary of TCLP Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

			19SB1_N_20	19SB1_N_20	19SB1_N_20	19SB1_W_10	19SB1_W_10	19SB1_W_20
Sample Designation:			19SB1_N_20	19SB1_N_20	19SB1_N_20	19SB1_W_10	19SB1_W_10	19SB1_W_20
Sample Date:			09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/03/2021
Sample Depth (ft bls):			12 - 14	17 - 19	23 - 25	10 - 12	21 - 23	10 - 12
Normal Sample or Field Duplicate:			N	N	N	N	N	N
Parameter	USEPA Regulatory Levels (mg/L)	Units						
1,1-Dichloroethene	0.7	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
1,2-Dichloroethane	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
1,4-Dichlorobenzene	7.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
Benzene	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
Carbon Tetrachloride	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
Chlorobenzene	100	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
Chloroform	6	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.5 U
Methyl Ethyl Ketone (2-Butanone)	200	MG/L	0.05 UT	0.05 UT	0.05 U	0.13 U	0.05 UT	2.5 U
Tetrachloroethylene (PCE)	<b>0.7</b>	MG/L	0.01 U	0.0099 J	0.15	<b>5.5</b>	0.059	<b>180</b>
Trichloroethylene (TCE)	<b>0.5</b>	MG/L	0.01 U	0.0048 J	0.029	0.096	0.01 U	<b>3.2</b>
Vinyl Chloride	0.2	MG/L	0.01 U	0.01 U	0.01 U	0.025	0.01 U	0.1 J

**Table 2. Summary of TCLP Volatile Organic Compounds in Soil, 148 Nagle Avenue, New York, New York**

Sample Designation:			19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_W_20	19SB1_W_20
Sample Date:			09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021
Sample Depth (ft bls):			15 - 17	15 - 17	17 - 19	19 - 21	21 - 23	23 - 25
Normal Sample or Field Duplicate:			N	FD	N	N	N	N
Parameter	USEPA Regulatory Levels (mg/L)	Units						
1,1-Dichloroethene	0.7	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
1,2-Dichloroethane	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
1,4-Dichlorobenzene	7.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
Benzene	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
Carbon Tetrachloride	0.5	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
Chlorobenzene	100	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
Chloroform	6	MG/L	0.01 U	0.01 U	0.01 U	0.025 U	0.01 U	0.01 U
Methyl Ethyl Ketone (2-Butanone)	200	MG/L	0.05 U	0.05 U	0.05 U	0.13 U	0.05 U	0.05 U
Tetrachloroethylene (PCE)	<b>0.7</b>	MG/L	0.29	0.18	0.61	<b>10</b>	0.035	0.0085 J
Trichloroethylene (TCE)	<b>0.5</b>	MG/L	0.006 J	0.01 U	0.008 J	0.061	0.01 U	0.01 U
Vinyl Chloride	0.2	MG/L	0.01 U	0.01 U	0.01 U	0.0082 J	0.01 U	0.01 U

**Table 3. Summary of Volatile Organic Compounds in Soil Vapor, Indoor Air and Ambient Air, 148 Nagle Avenue, New York, New York**

Sample Designation:		IA3	IA4	OA1	OA10	OA5	OA6	OA7	OA8
Sample Date:		12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
Parameter	Units								
1,1,1-Trichloroethane (TCA)	UG/M3	1.1 U							
1,1,2,2-Tetrachloroethane	UG/M3	1.4 U							
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	1.5 U	1.5 U	1.5 U	<b>0.48 J</b>	1.5 U	<b>0.5 J</b>	1.5 U	1.5 U
1,1,2-Trichloroethane	UG/M3	<b>0.24 J</b>	1.1 U						
1,1-Dichloroethane	UG/M3	0.81 U							
1,1-Dichloroethene	UG/M3	0.2 U							
1,2,4-Trichlorobenzene	UG/M3	3.7 U							
1,2,4-Trimethylbenzene	UG/M3	<b>0.66 J</b>	<b>0.49 J</b>	0.98 U	<b>0.52 J</b>	0.98 U	<b>0.6 J</b>	0.98 U	<b>0.33 J</b>
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	1.5 U							
1,2-Dichlorobenzene	UG/M3	1.2 U							
1,2-Dichloroethane	UG/M3	0.81 U							
1,2-Dichloropropane	UG/M3	0.92 U							
1,2-Dichlorotetrafluoroethane	UG/M3	1.4 U							
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	0.98 U							
1,3-Butadiene	UG/M3	<b>0.27 J</b>	<b>0.26 J</b>	<b>0.23 J</b>	<b>0.34 J</b>	<b>0.15 J</b>	<b>0.33 J</b>	<b>0.14 J</b>	0.44 U
1,3-Dichlorobenzene	UG/M3	1.2 U							
1,4-Dichlorobenzene	UG/M3	1.2 U							
1,4-Dioxane (P-Dioxane)	UG/M3	18 U							
2,2,4-Trimethylpentane	UG/M3	<b>1.4</b>	<b>1.8</b>	<b>0.6 J</b>	<b>0.9 J</b>	<b>0.84 J</b>	<b>1.8</b>	<b>0.72 J</b>	<b>0.78 J</b>
2-Chlorotoluene	UG/M3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	UG/M3	<b>2.4</b>	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Ethyltoluene	UG/M3	0.98 U							
Acetone	UG/M3	<b>100 D</b>	<b>120 D</b>	<b>8.9 J</b>	<b>5.4 J</b>	<b>7.2 J</b>	<b>6.8 J</b>	<b>5.1 J</b>	<b>9.3 J</b>
Allyl Chloride (3-Chloropropene)	UG/M3	1.6 U							
Benzene	UG/M3	<b>2.3</b>	<b>2.2</b>	<b>1.7</b>	<b>1.7</b>	<b>1.2</b>	<b>2</b>	<b>1.2</b>	<b>1.2</b>
Benzyl Chloride	UG/M3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	UG/M3	1.3 U							
Bromoform	UG/M3	2.1 U							
Bromomethane	UG/M3	0.78 U							
Butane	UG/M3	<b>8.4</b>	<b>13</b>	<b>5.6</b>	<b>4.2</b>	<b>4.3</b>	<b>7.1</b>	<b>5.6</b>	<b>4.8</b>
Carbon Disulfide	UG/M3	1.6 U							
Carbon Tetrachloride	UG/M3	<b>0.36</b>	<b>0.38</b>	<b>0.38</b>	<b>0.42</b>	<b>0.33</b>	<b>0.36</b>	<b>0.38</b>	<b>0.42</b>
Chlorobenzene	UG/M3	0.92 U							
Chlorodifluoromethane	UG/M3	<b>4.5</b>	<b>5.2</b>	<b>1.7 J</b>	<b>1.8</b>	<b>1.8</b>	<b>2</b>	<b>2.3</b>	<b>2.2</b>
Chloroethane	UG/M3	1.3 U							
Chloroform	UG/M3	<b>1.3</b>	<b>1.6</b>	0.98 U					

**Table 3. Summary of Volatile Organic Compounds in Soil Vapor, Indoor Air and Ambient Air, 148 Nagle Avenue, New York, New York**

Sample Designation:		IA3	IA4	OA1	OA10	OA5	OA6	OA7	OA8
Sample Date:		12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
Parameter	Units								
Chloromethane	UG/M3	1.5	1.5	1.2	1.2	1.1	1.4	1.2	1.3
Cis-1,2-Dichloroethylene	UG/M3	1.5	1	0.2 U					
Cis-1,3-Dichloropropene	UG/M3	0.91 U							
Cyclohexane	UG/M3	1.3	3.5	0.37 J	0.33 J	0.15 J	0.39 J	0.47 J	0.12 J
Cymene	UG/M3	1 J	0.65 J	1.1 U					
Dibromochloromethane	UG/M3	1.7 U							
Dichlorodifluoromethane	UG/M3	2 J	2.1 J	2.1 J	2.2 J	1.9 J	2.6	2.2 J	2.1 J
Ethylbenzene	UG/M3	0.74 J	1.2	0.87 U	0.5 J	0.87 U	0.58 J	0.87 U	0.87 U
Hexachlorobutadiene	UG/M3	2.1 U							
Isopropanol	UG/M3	37	49	12	6.1 J	5.6 J	6.9 J	5.6 J	4.4 J
Isopropylbenzene (Cumene)	UG/M3	0.98 U							
m,p-Xylene	UG/M3	2.3	4.2	2.2 U	1.5 J	2.2 U	1.7 J	1.1 J	0.96 J
Methyl Ethyl Ketone (2-Butanone)	UG/M3	1.4 J	1.8	0.88 J	1.5 U	0.71 J	1.5 U	0.54 J	0.79 J
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methyl Methacrylate	UG/M3	1.2 J	1.3 J	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	UG/M3	1.3 J	1.4 J	1.7 U	1.4 J	0.85 J	0.89 J	1.7 U	1.7 U
Naphthalene	UG/M3	2.6 U							
N-Butylbenzene	UG/M3	1.1 U							
N-Heptane	UG/M3	1.8	2.6	0.34 J	0.74 J	0.52 J	0.87	0.63 J	0.68 J
N-Hexane	UG/M3	2	2.6	1.1 J	1.1 J	1.8 U	1 J	0.9 J	1.8 U
N-Propylbenzene	UG/M3	0.98 U							
O-Xylene (1,2-Dimethylbenzene)	UG/M3	0.94	1.7	0.87 U	0.55 J	0.87 U	0.64 J	0.87 U	0.87 U
Sec-Butylbenzene	UG/M3	1.1 U							
Styrene	UG/M3	0.85 U							
T-Butylbenzene	UG/M3	1.1 U							
Tert-Butyl Alcohol	UG/M3	15 U							
Tert-Butyl Methyl Ether	UG/M3	0.72 U							
Tetrachloroethylene (PCE)	UG/M3	21	11	0.54 J	1.4 U				
Tetrahydrofuran	UG/M3	19	40	15 U					
Toluene	UG/M3	12	10	0.83	3.5	1.7	4.4	3.8	2.2
Trans-1,2-Dichloroethene	UG/M3	0.79 U							
Trans-1,3-Dichloropropene	UG/M3	0.91 U							
Trichloroethylene (TCE)	UG/M3	1.2	0.64	0.18 J	0.2 U				
Trichlorofluoromethane	UG/M3	1.1	1.3	1.1	1.2	1.1	1.4	1.2	1.3
Vinyl Bromide	UG/M3	0.87 U							
Vinyl Chloride	UG/M3	0.2 U							

**Table 3. Summary of Volatile Organic Compounds in Soil Vapor, Indoor Air and Ambient Air, 148 Nagle Avenue, New York, New York**

Sample Designation:		OA9	SS3	SS4	SV10	SV5	SV6	SV7	SV9
Sample Date:		12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
Parameter	Units								
1,1,1-Trichloroethane (TCA)	UG/M3	1.1 U	5.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
1,1,2,2-Tetrachloroethane	UG/M3	1.4 U	6.9 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	1.5 U	7.7 U	1.5 U	1.5 U	<b>0.42 J</b>	1.5 U	1.5 U	1.5 U
1,1,2-Trichloroethane	UG/M3	1.1 U	5.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
1,1-Dichloroethane	UG/M3	0.81 U	4 U	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
1,1-Dichloroethene	UG/M3	0.2 U	<b>6.5</b>	<b>10</b>	0.2 U				
1,2,4-Trichlorobenzene	UG/M3	3.7 U	19 U	3.7 U					
1,2,4-Trimethylbenzene	UG/M3	<b>0.3 J</b>	4.9 U	<b>4.3</b>	<b>0.48 J</b>	<b>1.1</b>	<b>0.58 J</b>	<b>0.4 J</b>	<b>0.36 J</b>
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	1.5 U	7.7 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
1,2-Dichlorobenzene	UG/M3	1.2 U	6 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
1,2-Dichloroethane	UG/M3	0.81 U	4 U	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U
1,2-Dichloropropane	UG/M3	0.92 U	4.6 U	0.92 U					
1,2-Dichlorotetrafluoroethane	UG/M3	1.4 U	7 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	0.98 U	4.9 U	<b>1.2</b>	0.98 U	<b>0.46 J</b>	0.98 U	0.98 U	0.98 U
1,3-Butadiene	UG/M3	0.44 U	2.2 U	<b>0.18 J</b>	0.44 U	<b>1.5</b>	<b>0.37 J</b>	0.44 U	<b>0.21 J</b>
1,3-Dichlorobenzene	UG/M3	1.2 U	6 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	UG/M3	1.2 U	6 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
1,4-Dioxane (P-Dioxane)	UG/M3	18 U	90 U	18 U	18 U	18 U	18 U	18 U	18 U
2,2,4-Trimethylpentane	UG/M3	<b>0.6 J</b>	<b>2.5 J</b>	<b>1.4</b>	<b>3.1</b>	<b>5.8</b>	<b>4.2</b>	<b>4.3</b>	<b>2.7</b>
2-Chlorotoluene	UG/M3	1 U	5.2 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	UG/M3	2 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Ethyltoluene	UG/M3	0.98 U	4.9 U	<b>1.1</b>	0.98 U	<b>0.5 J</b>	0.98 U	0.98 U	0.98 U
Acetone	UG/M3	<b>6.9 J</b>	59 U	<b>40</b>	<b>73</b>	<b>82 D</b>	<b>77</b>	<b>80 D</b>	<b>120 D</b>
Allyl Chloride (3-Chloropropene)	UG/M3	1.6 U	7.8 UT	1.6 U	1.6 UT				
Benzene	UG/M3	<b>0.71</b>	<b>11</b>	<b>2.5</b>	<b>2.4</b>	<b>1.6</b>	<b>2</b>	<b>1.3</b>	<b>1.3</b>
Benzyl Chloride	UG/M3	1 U	5.2 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	UG/M3	1.3 U	6.7 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Bromoform	UG/M3	2.1 U	10 U	2.1 U					
Bromomethane	UG/M3	0.78 U	3.9 U	0.78 U					
Butane	UG/M3	<b>2.6</b>	<b>140</b>	<b>62</b>	<b>3.1</b>	<b>37</b>	<b>6.1</b>	<b>2.7</b>	<b>7.3</b>
Carbon Disulfide	UG/M3	1.6 U	7.8 U	<b>1.1 J</b>	<b>1.7</b>	<b>1.6</b>	<b>16</b>	<b>0.46 J</b>	<b>0.76 J</b>
Carbon Tetrachloride	UG/M3	0.22 U	1.1 U	0.22 U	0.22 U	<b>0.22</b>	<b>0.31</b>	<b>0.24</b>	<b>0.2 J</b>
Chlorobenzene	UG/M3	0.92 U	4.6 U	<b>0.35 J</b>	0.92 U				
Chlorodifluoromethane	UG/M3	<b>0.81 J</b>	<b>17</b>	<b>25</b>	1.8 U	<b>1.1 J</b>	<b>1.4 J</b>	<b>1.4 J</b>	<b>1.3 J</b>
Chloroethane	UG/M3	1.3 U	6.6 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Chloroform	UG/M3	0.98 U	4.9 U	<b>0.61 J</b>	<b>2.2</b>	<b>2</b>	<b>13</b>	<b>12</b>	<b>0.71 J</b>

**Table 3. Summary of Volatile Organic Compounds in Soil Vapor, Indoor Air and Ambient Air, 148 Nagle Avenue, New York, New York**

Sample Designation:		OA9	SS3	SS4	SV10	SV5	SV6	SV7	SV9
Sample Date:		12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021	12/08/2021
Parameter	Units								
Chloromethane	UG/M3	<b>0.53 J</b>	5.2 U	1 U	<b>0.28 J</b>	<b>0.38 J</b>	<b>0.79 J</b>	<b>0.52 J</b>	<b>0.63 J</b>
Cis-1,2-Dichloroethylene	UG/M3	0.2 U	<b>140</b>	<b>220 D</b>	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cis-1,3-Dichloropropene	UG/M3	0.91 U	4.5 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U
Cyclohexane	UG/M3	<b>0.27 J</b>	<b>3.2 J</b>	<b>1.3</b>	<b>0.92</b>	<b>1.1</b>	<b>0.89</b>	<b>0.93</b>	<b>0.67 J</b>
Cymene	UG/M3	<b>1.6</b>	5.5 U	<b>2.9</b>	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Dibromochloromethane	UG/M3	1.7 U	8.5 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Dichlorodifluoromethane	UG/M3	<b>1.1 J</b>	12 U	<b>2.6</b>	<b>1.7 J</b>	<b>1.8 J</b>	<b>2 J</b>	<b>2.1 J</b>	<b>2.2 J</b>
Ethylbenzene	UG/M3	0.87 U	4.3 U	<b>2.9</b>	<b>0.61 J</b>	<b>4.6</b>	<b>1.8</b>	<b>2.3</b>	<b>2.1</b>
Hexachlorobutadiene	UG/M3	2.1 U	11 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Isopropanol	UG/M3	<b>2.4 J</b>	61 U	<b>13</b>	<b>5.1 J</b>	12 U	<b>4.9 J</b>	12 U	12 U
Isopropylbenzene (Cumene)	UG/M3	0.98 U	4.9 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U	0.98 U
m,p-Xylene	UG/M3	<b>1.2 J</b>	11 U	<b>9.7</b>	<b>1.9 J</b>	<b>16</b>	<b>4.8</b>	<b>6.4</b>	<b>6.3</b>
Methyl Ethyl Ketone (2-Butanone)	UG/M3	<b>5.6</b>	<b>3.5 J</b>	1.5 U	<b>1.6</b>	<b>1.5</b>	<b>1.4 J</b>	<b>2.3</b>	<b>1.8</b>
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	<b>1.1 J</b>	<b>11</b>	<b>0.8 J</b>	<b>12</b>	2 U	<b>1.3 J</b>	<b>2</b>	<b>0.98 J</b>
Methyl Methacrylate	UG/M3	2 U	10 U	<b>0.97 J</b>	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	UG/M3	1.7 U	8.7 UT	<b>1.3 J</b>	<b>0.72 JT</b>	<b>0.78 JT</b>	1.7 UT	<b>1.1 JT</b>	<b>1.5 JT</b>
Naphthalene	UG/M3	2.6 U	13 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
N-Butylbenzene	UG/M3	1.1 U	5.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
N-Heptane	UG/M3	<b>0.59 J</b>	<b>4.9</b>	<b>1.4</b>	<b>2.2</b>	<b>2.7</b>	<b>2.6</b>	<b>3.2</b>	<b>2.1</b>
N-Hexane	UG/M3	1.8 U	<b>20</b>	<b>2</b>	<b>2.8</b>	<b>7.4</b>	<b>2.8</b>	<b>3.3</b>	<b>2.9</b>
N-Propylbenzene	UG/M3	0.98 U	4.9 U	<b>0.78 J</b>	0.98 U	<b>0.57 J</b>	0.98 U	0.98 U	0.98 U
O-Xylene (1,2-Dimethylbenzene)	UG/M3	0.87 U	4.3 U	<b>3.8</b>	<b>0.68 J</b>	<b>6.4</b>	<b>1.9</b>	<b>2.5</b>	<b>2.4</b>
Sec-Butylbenzene	UG/M3	1.1 U	5.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Styrene	UG/M3	0.85 U	4.3 U	0.85 U	0.85 U	<b>0.16 J</b>	<b>0.15 J</b>	0.85 U	0.85 U
T-Butylbenzene	UG/M3	1.1 U	5.5 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Tert-Butyl Alcohol	UG/M3	15 U	76 UT	<b>4.5 J</b>	<b>7.3 JT</b>	15 UT	15 UT	15 UT	15 UT
Tert-Butyl Methyl Ether	UG/M3	0.72 U	3.6 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U	0.72 U
Tetrachloroethylene (PCE)	UG/M3	1.4 U	<b>4.4 J</b>	<b>72</b>	1.4 U	<b>3</b>	<b>0.96 J</b>	<b>0.44 J</b>	<b>0.94 J</b>
Tetrahydrofuran	UG/M3	15 U	74 U	15 U	15 U	15 U	15 U	15 U	15 U
Toluene	UG/M3	<b>3.5</b>	<b>6.1</b>	<b>17</b>	<b>4.1</b>	<b>34</b>	<b>19</b>	<b>30</b>	<b>18</b>
Trans-1,2-Dichloroethene	UG/M3	0.79 U	<b>120</b>	<b>7.6</b>	0.79 U	0.79 U	0.79 U	0.79 U	0.79 U
Trans-1,3-Dichloropropene	UG/M3	0.91 U	4.5 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U	0.91 U
Trichloroethylene (TCE)	UG/M3	0.2 U	<b>33</b>	<b>120</b>	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichlorofluoromethane	UG/M3	<b>0.54 J</b>	5.6 U	<b>0.94 J</b>	<b>0.85 J</b>	<b>1 J</b>	<b>1.2</b>	<b>1.1</b>	<b>1.1</b>
Vinyl Bromide	UG/M3	0.87 U	4.4 U	0.87 U	0.87 U	0.87 U	0.87 U	0.87 U	0.87 U
Vinyl Chloride	UG/M3	0.2 U	<b>920 D</b>	<b>70</b>	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

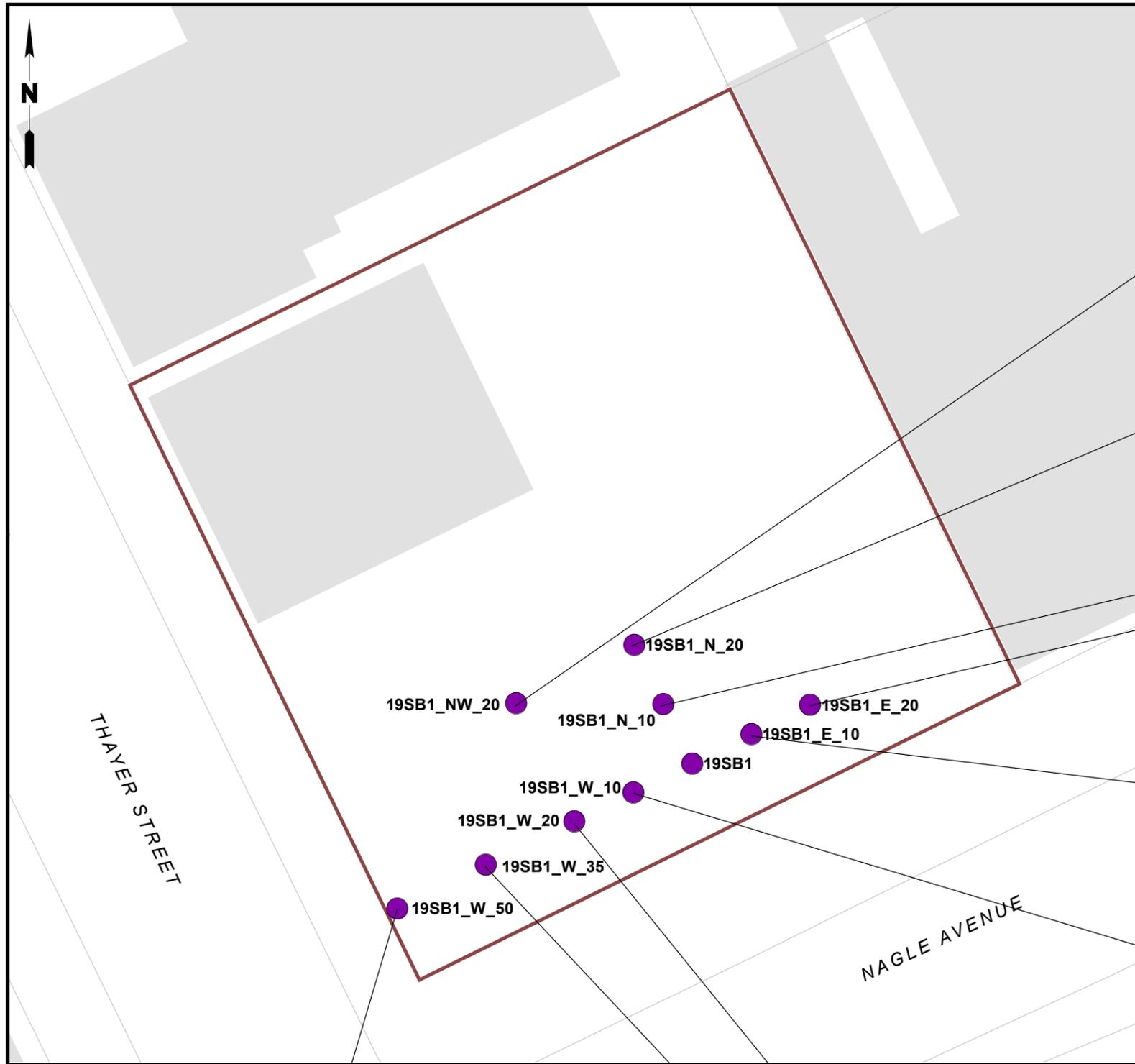
**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**FIGURES**

1. Summary of CVOCs in Soil
2. Summary of NYSDOH Matrix Compounds in Soil Vapor, Indoor Air and Ambient Air

V:\GIS\PROJECTS\3770\0001Y108\3770\0001Y108.1.MXD



CRITERIA

Parameter	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	NYSDEC Part 375 Restricted Residential Soil Cleanup Objectives
<b>VOCs (mg/kg)</b>		
Cis-1,2-Dichloroethylene	0.25	100
Tetrachloroethylene (PCE)	1.3	19
Trichloroethylene (TCE)	0.47	21
Vinyl Chloride	0.02	0.9

LEGEND

- LOCATION OF SOIL BORING
- SITE BOUNDARY

NOTES

- ALL CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAM

- CVOCs - CHLORINATED VOLATILE ORGANIC COMPOUNDS
- DUP - DUPLICATE SAMPLE
- FT BLS - FEET BELOW LAND SURFACE
- J - ESTIMATED VALUE
- ND - NO DETECTION
- NE - NO EXCEEDANCE
- NYSDEC - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
- T - INDICATES THAT A QUALITY CONTROL PARAMETER HAS EXCEEDED LABORATORY LIMITS
- VOCs - VOLATILE ORGANIC COMPOUNDS



<b>19SB1_NW_20</b>	12/06/2021
<b>Depth (ft bls)</b>	10 - 12
<b>VOCs</b>	
Tetrachloroethylene (PCE)	ND
Trichloroethylene (TCE)	ND
Cis-1,2-Dichloroethylene	NE
Vinyl Chloride	0.027

<b>19SB1_N_20</b>	09/02/2021	09/02/2021	09/02/2021
<b>Depth (ft bls)</b>	12 - 14	17 - 19	23 - 25
<b>VOCs</b>			
Tetrachloroethylene (PCE)	NE	2.9	3.3
Trichloroethylene (TCE)	ND	2	2
Cis-1,2-Dichloroethylene	ND	5.1	3.5
Vinyl Chloride	ND	0.89	0.057 J

<b>19SB1_N_10</b>	09/02/2021	09/02/2021
<b>Depth (ft bls)</b>	11 - 13	15 - 17
<b>VOCs</b>		
Tetrachloroethylene (PCE)	18	ND
Trichloroethylene (TCE)	2	ND
Cis-1,2-Dichloroethylene	4.4	2.8
Vinyl Chloride	0.19	0.68

<b>19SB1_E_20</b>	09/03/2021	09/03/2021
<b>Depth (ft bls)</b>	15 - 17	21 - 23
<b>VOCs</b>		
Tetrachloroethylene (PCE)	NE	NE
Trichloroethylene (TCE)	ND	ND
Cis-1,2-Dichloroethylene	ND	ND
Vinyl Chloride	ND	ND

<b>19SB1_E_10</b>	09/03/2021	09/03/2021
<b>Depth (ft bls)</b>	15 - 17	21 - 23
<b>VOCs</b>		
Tetrachloroethylene (PCE)	50	2.2
Trichloroethylene (TCE)	0.81	NE
Cis-1,2-Dichloroethylene	3.3	1.3
Vinyl Chloride	0.1 J	0.17

<b>19SB1_W_10</b>	09/02/2021	09/02/2021
<b>Depth (ft bls)</b>	10 - 12	21 - 23
<b>VOCs</b>		
Tetrachloroethylene (PCE)	1400	89
Trichloroethylene (TCE)	34	2.8 T
Cis-1,2-Dichloroethylene	68	4.3 T
Vinyl Chloride	4.4 J	0.22

<b>19SB1_W_50</b>	12/06/2021
<b>Depth (ft bls)</b>	10 - 12
<b>VOCs</b>	
Tetrachloroethylene (PCE)	NE
Trichloroethylene (TCE)	NE
Cis-1,2-Dichloroethylene	NE
Vinyl Chloride	0.067

<b>19SB1_W_35</b>	12/06/2021	12/06/2021
<b>Depth (ft bls)</b>	10 - 12	15 - 17
<b>VOCs</b>		
Tetrachloroethylene (PCE)	NE	NE
Trichloroethylene (TCE)	NE	NE
Cis-1,2-Dichloroethylene	0.76	0.64
Vinyl Chloride	0.14	NE

<b>19SB1_W_20</b>	09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021	09/03/2021
<b>Depth (ft bls)</b>	10 - 12	15 - 17	15 - 17 DUP	17 - 19	19 - 21	21 - 23	23 - 25
<b>VOCs</b>							
Tetrachloroethylene (PCE)	30,000	83	120	54	540	230	8.2
Trichloroethylene (TCE)	210	1.7	2.2	0.62	3.4	1	NE
Cis-1,2-Dichloroethylene	430	4.5	7.7	0.47	12	1.2	NE
Vinyl Chloride	ND	0.39	0.64	0.068 J	0.61 J	ND	ND

Title: **SUMMARY OF CVOCs IN SOIL**

148 NAGLE AVENUE  
MANHATTAN, NY

Prepared for: **DYCKMAN CRESTVIEW REALTY, LLC**

	Compiled by: R.H.	Date: 01/27/22	FIGURE <b>1</b>
	Prepared by: M.S.R.	Scale: AS SHOWN	
	Project Mgr: R.H.	Project: 3770.0001Y000	
	File: 3770.0001Y108.1.mxd		



OA7		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.38	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	ND	
Vinyl Chloride	ND	

SV7		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.24	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	0.44 J	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	1.1 JT	
Vinyl Chloride	ND	

SV6		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.31	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	0.96 J	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	ND	
Vinyl Chloride	ND	

OA6		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.36	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	0.89 J	
Vinyl Chloride	ND	

IA4		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.38	
Trichloroethylene (TCE)	0.64	
Cis-1,2-Dichloroethylene	1	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	11	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	1.4 J	
Vinyl Chloride	ND	

SS4		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	ND	
Trichloroethylene (TCE)	120	
Cis-1,2-Dichloroethylene	220 D	
1,1-Dichloroethene	10	
Tetrachloroethylene (PCE)	72	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	1.3 J	
Vinyl Chloride	70	

OA1		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.38	
Trichloroethylene (TCE)	0.18 J	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	0.54 J	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	ND	
Vinyl Chloride	ND	

SS3		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	ND	
Trichloroethylene (TCE)	33	
Cis-1,2-Dichloroethylene	140	
1,1-Dichloroethene	6.5	
Tetrachloroethylene (PCE)	4.4 J	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	ND	
Vinyl Chloride	920 D	

IA3		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.36	
Trichloroethylene (TCE)	1.2	
Cis-1,2-Dichloroethylene	1.5	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	21	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	1.3 J	
Vinyl Chloride	ND	

SV5		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.22	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	3	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	0.78 JT	
Vinyl Chloride	ND	

OA5		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.33	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	0.85 J	
Vinyl Chloride	ND	

OA8		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.42	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	ND	
Vinyl Chloride	ND	

OA9		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	ND	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	ND	
Vinyl Chloride	ND	

SV9		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.2 J	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	0.94 J	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	1.5 JT	
Vinyl Chloride	ND	

OA10		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	0.42	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	1.4 J	
Vinyl Chloride	ND	

SV10		12/08/2021
<b>VOCs</b>		
Carbon Tetrachloride	ND	
Trichloroethylene (TCE)	ND	
Cis-1,2-Dichloroethylene	ND	
1,1-Dichloroethene	ND	
Tetrachloroethylene (PCE)	ND	
1,1,1-Trichloroethane (TCA)	ND	
Methylene Chloride	0.72 JT	
Vinyl Chloride	ND	



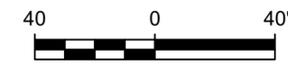
**LEGEND**

- LOCATION OF SIDEWALK SOIL VAPOR SAMPLE
- LOCATION OF INDOOR AIR SAMPLE
- LOCATION OF OUTDOOR AIR SAMPLE
- LOCATION OF SUBSLAB VAPOR
- SITE BOUNDARY

**NOTES**

- ALL CONCENTRATIONS SHOWN IN MICROGRAMS PER CUBIC METER
- SOIL VAPOR POINT SV8 WAS NOT SAMPLED BECAUSE THE POINT WAS REMOVED FROM THE GROUND BY A THIRD-PARTY PRIOR TO SAMPLING. NYSDEC CASE MANAGER WAS NOTIFIED ON 12/08/2021.

D - A SECONDARY ANALYSIS AFTER DILUTION DUE TO EXCEEDANCE OF THE CALIBRATION RANGE IN THE ORIGINAL SAMPLE.  
 J - ESTIMATED VALUE  
 ND - COMPOUND WAS ANALYZED FOR BUT NOT DETECTED  
 T - INDICATES THAT A QUALITY CONTROL PARAMETER HAS EXCEEDED LABORATORY LIMITS  
 VOCs - VOLATILE ORGANIC COMPOUNDS



Title: **SUMMARY OF NYSDOH MATRIX COMPOUNDS IN SOIL VAPOR, INDOOR AIR AND AMBIENT AIR**

148 NAGLE AVENUE  
MANHATTAN, NY

Prepared for: **DYCKMAN CRESTVIEW REALTY, LLC**

Compiled by: R.H.	Date: 06/01/22	FIGURE <b>2</b>
Prepared by: M.S.R.	Scale: AS SHOWN	
Project Mgr: R.H.	Project: 3770.0001Y000	
File: 3770.0001Y108.2.mxd		

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**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDICES**

- A. New York State Department of Health Soil Vapor/Indoor Air Matrices
- B. Division of Air Resources (DAR 1) Screening Analysis
- C. QAPP for Indoor Air Testing
- D. Sub-Slab Depressurization System Operations and Maintenance Log
- E. Health and Safety Plan
- F. Community Air Monitoring Plan

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX A**

New York State Department of Health Soil Vapor/Indoor Air Matrices

# Soil Vapor/Indoor Air Matrix A

May 2017

**Analytes Assigned:**

Trichloroethene (TCE), *cis*-1,2-Dichloroethene (c12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )		
	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

**No further action:** No additional actions are recommended to address human exposures.

**Identify Source(s) and Resample or Mitigate:** We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

**Monitor:** We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**Mitigate:** We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**These general recommendations are made with consideration being given to the additional notes on page 2.**

## ADDITIONAL NOTES FOR MATRIX A

---

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

- [1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).
- [2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.
- [3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.
- [4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.
- [5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.
- [6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

# Soil Vapor/Indoor Air Matrix B

May 2017

**Analytes Assigned:**

Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )		
	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

**No further action:** No additional actions are recommended to address human exposures.

**Identify Source(s) and Resample or Mitigate:** We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

**Monitor:** We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**Mitigate:** We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**These general recommendations are made with consideration being given to the additional notes on page 2.**

## ADDITIONAL NOTES FOR MATRIX B

---

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

- [1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).
- [2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.
- [3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.
- [4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.
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- [6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

# Soil Vapor/Indoor Air Matrix C

May 2017

## Analytes Assigned:

Vinyl Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	
	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

**No further action:** No additional actions are recommended to address human exposures.

**Identify Source(s) and Resample or Mitigate:** We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

**Monitor:** We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**Mitigate:** We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

## ADDITIONAL NOTES FOR MATRIX C

---

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

- [1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).
- [2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.
- [3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.
- [4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.
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- [6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX B**

Division of Air Resources (DAR 1) Screening Analysis

## Guidance on Air Emissions of VOCs at DER Remediation Sites

The below represents technical guidance that has been developed by the Division of Environmental Remediation (DER) and the Division of Air Resources (DAR) technical staff to ensure that remedial systems meet the substantive requirements of DAR regulations. Nothing in this guidance restricts the ability of DEC to require treatment of air discharges from remedial systems which DEC or NYSDOH determines is necessary to protect human health or the environment.

### Treatment Requirements for Volatile Organic Chemicals (VOCs):

The High Toxicity Air Contaminant (HTAC) List is provided in 6 NYCRR [Part 212-2.2 Table 2](#). For DER, the most common HTAC chemicals include:

- benzene,
- tetrachloroethylene (PCE),
- trichloroethylene (TCE),
- carbon tetrachloride, and
- vinyl chloride.

Treatment is required (as described in [Part 212-2.1](#)) for any remedial system that has a potential to emit greater than 0.1 lbs./hr. of a HTAC. Treatment is required below this level if the annual total emissions exceeds the Mass Emission Limit provided in [Table 2](#) (examples provided below).

Chemical Name	CASRN	Mass Emission Limit (pounds per year)	Calculated average pounds per hour
Carbon tetrachloride	56-23-5	100	0.011
Benzene	71-43-2	100	0.011
Vinyl Chloride	75-01-4	100	0.011
Trichloroethelene (TCE)	79-01-6	500	0.057
Perchloroethylene (PCE)	127-18-4	1000	0.11

If the remedial system does not have the potential to emit greater than 0.1 lbs./hr. of a HTAC and potential emissions are below the Mass Emission Limit, then no treatment and no further evaluation is required. If potential emissions are above the Mass Emission Limit, but below 0.1 lbs./hr., then treatment is required unless a Toxicity Impact Analysis is provided, in accordance with [DAR-1](#), demonstrating compliance with Annual Guideline Concentrations/Short-Term Guidance Concentrations (AGC/SGCs).

For non-HTAC volatile organic chemicals, treatment is required if the system has the potential to emit total VOCs at a rate greater than 0.5 lbs./hr.

The following systems require treatment based on DER experience:

- **Soil vapor extraction (SVE)** systems are expected to require treatment;
- **Thermal remediation** (in- or ex-situ) will generally require treatment;
- **Excavation enclosures:** Temporary structures in place to control vapors and odors from excavation of contaminated soils will generally require treatment.
- **Air strippers** generally would not require treatment, however, for larger systems or systems with HTACs, it is good practice to confirm this; and

- **Sub-slab depressurization systems (SSDS)** This guidance does not alter the requirement for compliance with the minimum requirements of the NYSDOH SVI guidance. Generally, SSDS do not require off-gas treatment. For larger systems or systems with HTACs, the need for treatment to comply with this *Guidance on Air Emissions at DER Remediation Sites* should be evaluated. For SSDS discharges unavoidably near receptors, treatment should be considered (e.g. dense residential/commercial neighborhoods).

**Major Sources:**

DAR has additional requirements for major sources of contamination, as described in [6NYCRR Part 201-2.1\(b\)\(21\)](#).

- For VOCs, the threshold to be considered a major source for the majority of the state is 50 tons/year. In the NY Metro Area (all of Long Island, New York City, Rockland County, Westchester County, and the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, and Woodbury) the threshold is 25 tons/year.
- For [hazardous air pollutants \(HAPs\)](#) statewide, the thresholds are 10 tons/year for any single HAP and 25 tons/year for any combination of HAPs.

If any of these thresholds may potentially be exceeded, DAR must be consulted to ensure that air treatment and discharge meet all applicable requirements.

**Ozone Depleting Substances and Greenhouse Gases:**

For any remediation option which would discharge chlorofluorocarbons (CFCs) or other ozone depleting substances (ODS), the Feasibility Study or Alternatives Analysis must evaluate the feasibility of treatment to minimize discharge of ODS. If treatment to minimize discharge of ODS is required, it must be called for in the Decision Document (such as the Record of Decision) using the remedy selection criteria found in [6 NYCRR Part 375-1.8\(f\)](#).

[DER-31](#) and [CP-49](#) require that the cleanup of remedial sites be considered in a larger context, including ODS and greenhouse gas (GHG) emissions. Some CFCs (as well as hydrofluorocarbons (HFC) and methane) are potent GHGs, some of which are thousands of times more potent than CO<sub>2</sub>. Unnecessary discharge of these potent GHGs should be avoided.

The most common CFCs are Freons (e.g. Freon 114, Freon 11, Freon 23, Freon 12). Some of these are readily treated with activated carbon, but some are not. The following chart provides a comparison of the adsorption capacities for several Freon compounds relative to PCE and TCE:

Freon 23:	0.0001 gm adsorbed/100 gm carbon
Freon 12:	3.1 gm adsorbed/100 gm carbon
Freon 113:	20.0 gm adsorbed/100 gm carbon
TCE:	16.6 gm adsorbed/100 gm carbon
PCE:	27.5 gm adsorbed/100 gm carbon

**Table 1. DAR-1 Screening Level Worksheet**

156 Nagle Avenue, Manhattan, NY

Calculations based on sub-slab sample results for SS-3 and SS-4 from 9/3/21.

Chemical Name	CAS Number	µg/m3	Molar Mass (g/mol)	PPMv	SGC (µg/m3)	AGC (µg/m3)
1,1-Dichloroethene (Vinylidene Chloride)	00075-35-4	10.00	96.940	0.0025	N/A	200.00
1,2,4-Trimethylbenzene (Pseudocumene)	00095-63-6	4.30	120.190	0.0009	N/A	60.00
1,3,5-Trimethylbenzene (Mesitylene)	00108-67-8	1.20	120.190	0.0002	N/A	60.00
1,3-Butadiene	00106-99-0	0.18	54.092	0.0001	N/A	0.03
2,2,4-Trimethylpentane (Isooctane)	00540-84-1	2.50	114.232	0.0005	N/A	3300.00
4-Ethyltoluene	00622-96-8	1.10	120.195	0.0002	N/A	N/A
Acetone	00067-64-1	40.00	58.080	0.0166	180000.00	30000.00
Benzene	00071-43-2	11.00	78.114	0.0034	27.00	0.13
Butane	00106-97-8	140.00	58.124	0.0579	N/A	N/A
Carbon Disulfide	00075-15-0	1.10	76.130	0.0003	6200.00	700.00
Chlorobenzene	00108-90-7	0.35	112.560	0.0001	N/A	60.00
Chlorodifluoromethane	00075-45-6	25.00	86.470	0.0070	N/A	50000.00
Chloroform	00067-66-3	0.61	119.370	0.0001	150.00	14.70
Cis-1,2-Dichloroethylene (DCE)	00156-59-2	220.00	96.950	0.0546	N/A	63.00
Cyclohexane	00110-82-7	3.20	84.162	0.0009	N/A	6000.00
Cymene	00099-87-6	2.90	134.220	0.0005	N/A	N/A
Dichlorodifluoromethane	00075-71-8	2.60	120.910	0.0005	N/A	12000.00
Ethylbenzene	00100-41-4	2.90	106.168	0.0007	N/A	1000.00
Isopropanol (Isopropyl Alcohol)	00067-63-0	13.00	60.096	0.0052	98000.00	7000.00
m,p-Xylene (M-, O- & P- Mixture)	01330-20-7	9.70	106.160	0.0022	22000.00	100.00
Methyl Ethyl Ketone (2-Butanone)	00078-93-3	3.50	72.107	0.0012	13000.00	5000.00
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	00108-10-1	11.00	100.160	0.0026	31000.00	3000.00
Methyl Methacrylate	00080-62-6	0.97	100.117	0.0002	41000.00	700.00
Methylene Chloride (Dichloromethane)	00075-09-2	1.30	84.930	0.0004	14000.00	46.00
N-Heptane	00142-82-5	4.90	100.205	0.0012	210000.00	3900.00
N-Hexane	00110-54-3	20.00	86.178	0.0056	N/A	700.00
N-Propylbenzene	00103-65-1	0.78	120.195	0.0002	54000.00	1000.00
O-Xylene (1,2-Dimethylbenzene)	00095-47-6	3.80	106.168	0.0009	22000.00	100.00
Tert-Butyl Alcohol	00075-65-0	4.50	74.123	0.0015	N/A	720.00
Tetrachloroethylene (PCE)	00127-18-4	72.00	165.820	0.0104	300.00	3.80
Toluene	00108-88-3	17.00	92.141	0.0044	37000.00	5000.00
Trans-1,2-Dichloroethene (Dichloroethylene)	00156-60-5	120	96.950	0.0298	N/A	63.0
Trichloroethylene (TCE)	00079-01-6	120.00	131.380	0.0220	20.00	0.21
Trichlorofluoromethane	00075-69-4	0.94	137.360	0.0002	9000.00	5000.00
Vinyl Chloride	00075-01-4	920.00	62.500	0.3540	180000.00	0.11

**Calculate Emission Rate in Pounds/Hour (lb/hr):**

Flow Rate = 100 cfm (2 - RadonAway GP-501 running at approx 3" WC at 50 CFM each)

Emission Rate (lb/hr) = Flow Rate (cfm) \* Concentration (PPMv) \* Molecular Weight (g/mol) \* 1.581E-07

Note that 1.581E-07 = 1/10<sup>6</sup> ppm-v \* 60 minutes/hour \* 1 lb-mole/379.5 ft<sup>3</sup>

Emission Rates for:	Q	Qa	Part 212-2.2 Table 2 HTAC Mass Emission Limit	
1,1-Dichloroethene (Vinylidene Chloride)	0.0000038 lb/hr or	0.033 lb/yr	N/A lb/yr	OK
1,2,4-Trimethylbenzene (Pseudocumene)	0.0000016 lb/hr or	0.014 lb/yr	N/A lb/yr	OK
1,3,5-Trimethylbenzene (Mesitylene)	0.0000005 lb/hr or	0.004 lb/yr	N/A lb/yr	OK
1,3-Butadiene	0.0000001 lb/hr or	0.001 lb/yr	25 lb/yr	OK
2,2,4-Trimethylpentane (Isooctane)	0.0000010 lb/hr or	0.008 lb/yr	N/A lb/yr	OK
4-Ethyltoluene	0.0000004 lb/hr or	0.004 lb/yr	N/A lb/yr	OK
Acetone	0.0000152 lb/hr or	0.133 lb/yr	N/A lb/yr	OK
Benzene	0.0000042 lb/hr or	0.037 lb/yr	100 lb/yr	OK
Butane	0.0000532 lb/hr or	0.466 lb/yr	N/A lb/yr	OK
Carbon Disulfide	0.0000004 lb/hr or	0.004 lb/yr	N/A lb/yr	OK
Chlorobenzene	0.0000001 lb/hr or	0.001 lb/yr	N/A lb/yr	OK
Chlorodifluoromethane	0.0000095 lb/hr or	0.083 lb/yr	N/A lb/yr	OK
Chloroform	0.0000002 lb/hr or	0.002 lb/yr	N/A lb/yr	OK
Cis-1,2-Dichloroethylene (DCE)	0.0000837 lb/hr or	0.733 lb/yr	N/A lb/yr	OK
Cyclohexane	0.0000012 lb/hr or	0.011 lb/yr	N/A lb/yr	OK
Cymene	0.0000011 lb/hr or	0.010 lb/yr	N/A lb/yr	OK
Dichlorodifluoromethane	0.0000010 lb/hr or	0.009 lb/yr	N/A lb/yr	OK
Ethylbenzene	0.0000011 lb/hr or	0.010 lb/yr	N/A lb/yr	OK
Isopropanol (Isopropyl Alcohol)	0.0000049 lb/hr or	0.043 lb/yr	N/A lb/yr	OK
m,p-Xylene (M-, O- & P- Mixture)	0.0000037 lb/hr or	0.032 lb/yr	N/A lb/yr	OK
Methyl Ethyl Ketone (2-Butanone)	0.0000013 lb/hr or	0.012 lb/yr	N/A lb/yr	OK
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	0.0000042 lb/hr or	0.037 lb/yr	N/A lb/yr	OK
Methyl Methacrylate	0.0000004 lb/hr or	0.003 lb/yr	N/A lb/yr	OK
Methylene Chloride (Dichloromethane)	0.0000005 lb/hr or	0.004 lb/yr	N/A lb/yr	OK
N-Heptane	0.0000019 lb/hr or	0.016 lb/yr	N/A lb/yr	OK
N-Hexane	0.0000076 lb/hr or	0.067 lb/yr	N/A lb/yr	OK
N-Propylbenzene	0.0000003 lb/hr or	0.003 lb/yr	N/A lb/yr	OK
O-Xylene (1,2-Dimethylbenzene)	0.0000014 lb/hr or	0.013 lb/yr	N/A lb/yr	OK

Tert-Butyl Alcohol	0.0000017 lb/hr or	0.015 lb/yr	N/A lb/yr	OK
Tetrachloroethylene (PCE)	0.0000274 lb/hr or	0.240 lb/yr	1000 lb/yr	OK
Toluene	0.0000065 lb/hr or	0.057 lb/yr	N/A lb/yr	OK
Trans-1,2-Dichloroethene (Dichloroethylene)	0.0000456 lb/hr or	0.400 lb/yr	N/A lb/yr	OK
Trichloroethylene (TCE)	0.0000456 lb/hr or	0.400 lb/yr	500 lb/yr	OK
Trichlorofluoromethane	0.0000004 lb/hr or	0.003 lb/yr	N/A lb/yr	OK
Vinyl Chloride	0.0003498 lb/hr or	3.064 lb/yr	100 lb/yr	OK

Since the remedial system does not have the potential to emit greater than 0.1 lb/hr of a HTAC and 0.5 lb/hr of a non-HTAC VOC and the annual total emissions do not exceed the Mass Emission Limits, no treatment is necessary.

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX C**

QAPP for Indoor Air Testing



# Quality Assurance Project Plan

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156 Nagle Avenue  
Manhattan, New York

October 18, 2022

Prepared for:

**Dyckman Crestview Realty LLC**  
13 Harding Terrace  
Morristown, New Jersey 07960

Prepared by:

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

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# 1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), on behalf of Dyckman Crestview Realty, LLC (Dyckman Crestview), has prepared this Quality Assurance Project Plan (QAPP) to describe the measures that will be taken to ensure the data generated during performance of the Interim Remedial Measure (IRM) Work Plan (IRM WP) for 156 Nagle Avenue, Manhattan, New York (156 Nagle) are of sufficient quality to meet project-specific data quality objectives (DQOs). This QAPP also describes the appropriate field sampling procedures. 156 Nagle is adjacent to the 148 Nagle Site (Site), which is enrolled in the New York State Brownfield Cleanup Program (NYS BCP).

Due to the presence of chlorinated volatile organic compound (CVOC)-contamination at the Site, Dyckman Crestview plans to remediate the Site under the NYS BCP. As part of their responsibilities as a Participant in the NYS BCP, the Participant will also install a sub-slab depressurization system (SSDS) to address the potential for indoor air contamination at the adjacent 156 Nagle building. This QAPP was prepared in accordance with the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation (DER-10) and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G 4).

## 1.1 Purpose

The QAPP describes in detail the field sampling and quality assurance/quality control (QA/QC) methods to be used during sub-slab vapor, indoor air and ambient air sampling tasks performed during the IRM WP.

This QAPP was prepared in accordance with the NYSDEC's DER-10 and provides guidelines and procedures to be followed by field personnel during performance of sampling during the system start-up. Information contained in this QAPP relates to:

- Sampling objectives (Section 2);
- Project organization (Section 3);
- Sample media, sampling locations, analytical suites, sampling frequencies, and laboratory analysis (Section 4);
- Field sampling procedures (Section 5);
- Sample handling, sample analysis, and quality assurance/quality control (Section 6); and
- Site control procedures and decontamination (Section 7).

## 2. Sampling Objectives

The objective of the proposed sampling is to evaluate the performance of the SSDS system at start-up.

Based on the review of the previous investigations completed for the Site, the following area of concern (AOC) was identified within the Site limits:

- Potential soil vapor and indoor air contamination associated with former Site dry cleaner use.

Based on the existing data for the Site the following objectives have been identified for the IRM WP:

- As part of the SSDS start-up, indoor air, sub-slab vapor and ambient air samples will be collected to verify the system is mitigating potential vapor intrusion at 156 Nagle.

Sampling procedures are discussed in Section 5 of this QAPP. A discussion of the DQOs and quality assurance/quality control is provided in Section 6.

### 3. Project Organization

A general summary of the overall management structure and responsibilities of project team members are presented below.

#### Project Principal

Mr. Frank Cherena, P.G. of Roux will serve as Project Principal. The Project Principal is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the system start-up.

#### Remedial Engineer

The Remedial Engineer for this project will be Mr. David Kaiser, P.E. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the IRM WP and future remedial program for the Site. The Remedial Engineer will certify that the start-up activities were observed by qualified environmental professionals under supervision as well as any other relevant provisions of ECL 27-1419 have been achieved in full conformance with the IRM WP.

#### Project Manager

Ms. Rachel Henke of Roux will serve as Project Manager. The Project Manager is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the work. This individual will provide overall management for the implementation of the scope of work and will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation.

#### Field Team Leader

The Field Team Leader is Ms. Shannon Edmonds. The Field Team Leader bears the responsibility for the successful execution of the field program. The Field Team Leader will direct the activities of the technical staff in the field, as well as all subcontractors. The Field Team Leader will also assist in the interpretation of data and in report preparation. The Field Team Leader reports to the Project Manager.

#### Laboratory Project Manager

Laboratory analysis will be completed by Eurofins TestAmerica of South Burlington, Vermont, a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified laboratory (10391). The Laboratory Project Manager is Melissa Haas. The Laboratory Project Manager is responsible for sample container preparation, sample custody in the laboratory, and completion of the required analysis through oversight of the laboratory staff. The Laboratory Project Manager will ensure that quality assurance procedures are followed, and an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Field Team Leader.

#### Quality Assurance Officer

Charles J. McGuckin, P.E. of Roux will serve as the Quality Assurance Officer (QAO) for this project. The QAO is responsible for conducting reviews, inspections, and audits to ensure the data collection is conducted in accordance with the QAPP/FSP. The QAO's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The QAO reports to the Project Manager and makes independent recommendations to the Field Team Leader.

## 4. Sample Media, Locations, Analytical Suites, and Frequency

The media to be sampled during the SSDS start-up include indoor air, sub-slab vapor and ambient air. Sampling locations, analytical suites, and frequency may vary by medium. A discussion of the sampling schedule for each medium is provided below, while the assumed number of field samples to be collected for each medium, including QC samples, is shown in Tables 1 and 2. Specifics regarding the collection of samples at each location and for each task are provided in Section 5 of this QAPP.

### 4.1 Indoor Air, Sub-slab Vapor and Outdoor Ambient Air

The proposed indoor air, sub-slab vapor and ambient air sampling locations are described in the table below. All indoor air, sub-slab vapor and ambient air samples will be collected in accordance with the October 2006 (Rev. May 2017) New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance).

Region of Site	Sample Identification	Sample Depth
Indoor Air	IA3 through IA8	Breathing zone
Ambient Air	OA1	Outdoor background atmospheric conditions
Sub-slab Vapor	SS-E through SS-G	Sub-slab (in building area outside of SSDS influence)

Samples will be analyzed at a NYSDOH Environmental Laboratory Approval Program-certified laboratory using USEPA Method TO-15 for VOCs. All indoor air, sub-slab vapor and outdoor ambient air samples will be collected using pre-cleaned (batch certified) 2.7-liter summa canisters with regulators calibrated to collect samples over an 8-hour period.

#### Indoor, Sub-slab and Ambient Air Sampling

Six indoor air samples will be collected from the basement of the westernmost tenant space in the building at 156 Nagle. To the extent practicable, the indoor air sample will be placed in well-ventilated and open area typical of the normal working environment.

Three sub-slab vapor samples will be collected from beneath the slab of the portion of the basement of the 156 Nagle outside the SSDS influence.

The outdoor ambient air sample (OA1) will be collected concurrently with the indoor air sample. The outdoor ambient air sample will serve to better define the background atmospheric conditions within the area of the Site. This canister will be placed in a location chosen to provide representative background results based on conditions at the time of sampling. The ambient air will be sampled concurrently with the indoor air sample and by utilizing the same sample collection methods and equipment.

## 5. Field Sampling Procedures

This section provides a detailed discussion of the field procedures to be used during sampling of the various media being evaluated as part of the Investigation (i.e., indoor air and outdoor ambient air). As discussed, the sample locations are shown on Drawing 1 of the IRM WP. Additional details regarding sampling procedures and protocols are described in Roux's relevant Standard Operating Procedures (SOPs), which are provided in Appendix A.

### 5.1 Indoor Air and Ambient Air Sampling

Six indoor air samples, three sub-slab samples and one ambient air sample will be collected during the system startup to gain an understanding of indoor air quality and to evaluate the performance of the SSDS system. Details for the installation of sub-slab vapor points and collection of indoor air and ambient samples are provided below.

Six indoor air samples will be collected from the basement to evaluate if vapor intrusion is occurring while the SSDS is running. To the extent practicable, the indoor air sample canister will be placed in a well-ventilated and open area typical of the normal working environment. The indoor air samples will be collected using pre-cleaned 2.7-liter summa canisters with regulators calibrated to collect samples over an 8-hour period and analyzed using USEPA Method TO-15 SIM for VOCs.

Three sub-slab vapor samples will be collected from beneath the basement slab outside the influence of the SSDS to evaluate if vapor intrusion is occurring while the SSDS is running. The sub-slab air samples will be collected using pre-cleaned 2.7-liter summa canisters with regulators calibrated to collect samples over an 8-hour period and analyzed using USEPA Method TO-15 SIM for VOCs.

One ambient air sample will be collected outside the building to characterize Site-specific background outdoor air conditions and to evaluate the potential influence, if any, of outdoor air on the indoor air sample. The outdoor ambient air samples will be collected outside the building within the Site bounds. The outdoor ambient air will be sampled concurrent with the indoor air sample and by utilizing the same sample collection methods and equipment. The outdoor ambient air sample (OA1) will be collected concurrently with the indoor air sample. The ambient air sample will be collected using a pre-cleaned 2.7-liter summa canister with a regulator calibrated to collect the sample over an 8-hour period and analyzed using USEPA Method TO-15 SIM for VOCs. This canister will be placed in a location chosen to provide representative background results based on conditions at the time of sampling.

## 6. Sample Handling and Analysis

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples, as well as sample packaging, shipping procedures, and QA/QC.

### 6.1 Field Sample Handling

A discussion of the proposed number and types of samples to be collected during each task, as well as the analyses to be performed, can be found in Section 4 of this QAPP. The types of containers, volumes, and preservation techniques for the aforementioned testing parameters are presented in Table 3.

### 6.2 Sample Custody Documentation

The purpose of documenting sample custody is to ensure the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis (and return of unused sample portions, if applicable).

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels should be pre-printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the fieldwork and to decide if additional samples are required.

All samples being shipped offsite for analysis must be accompanied by a properly completed chain of custody form. The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

### 6.3 Sample Shipment

Laboratory analysis will be completed by Eurofins TestAmerica of South Burlington, Vermont, a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified laboratory (10391). Sample packaging and shipping procedures are based upon USEPA specifications, as well as DOT regulations. The procedures vary according to potential sample analytes, concentration, and matrix and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below.

All samples will be shipped within 24 hours of collection and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare container(s) for shipment:
  - affix “This Side Up” arrow labels and “Fragile” labels on each container; and
  - place mailing label with laboratory address on top of container(s).

2. Arrange sample containers in groups by sample number.
3. Ensure all labels are completed correctly. Place clear tape over labels to prevent moisture accumulation from causing the label to peel off.
4. Place packaging material appropriately at the bottom of the container to act as a cushion for the samples.
5. Arrange containers so they are not in contact with other samples.
6. Fill remaining spaces with packaging material.
7. Ensure all canisters are firmly packed in packaging material.
8. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to courier as appropriate.
9. Separate chain of custody forms. Seal proper copies within a large Ziploc™ bag and tape to inside cover of containers. Retain copies of all forms.
10. Close lid and latch.
11. Secure each container using custody seals.
12. Tape container shut on both ends.
13. Relinquish to overnight delivery service as appropriate. Retain air bill receipt for project records. (Note: All samples will be shipped for “NEXT A.M.” delivery).

#### **6.4 Quality Assurance/Quality Control**

Judy Harry of Data Validation Services will review the analytical data for quality assurance and quality control in accordance with NYSDEC standards.

The primary DQO of the indoor air, sub-slab vapor and ambient air programs is that data be accurate and precise, thus, representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors.

Table 1 lists the requirements for field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised. Table 2 lists the number/type of field and QA/QC samples that will be collected during the IRM. Table 3 lists the preservation, holding times and sample container information.

All “assessment” analyses (i.e. TO-15) will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW 846 methods.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and 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>) and recent updated procedures enacted in November 2018. A Data Usability Report will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated. The DUSR will be prepared by Judy Harry, a third-party data validator.

## 7. Site Control Procedures

Site control procedures, including decontamination and waste handling and disposal, are discussed below. Site control procedures have been developed to minimize both the risk of exposure to contamination and the spread of contamination during field activities at the Site. All personnel who come into designated work areas, including contractors and observers, will be required to adhere strictly to the conditions imposed herein and to the provisions of a Site-Specific Health and Safety Plan (HASP). The HASP is included as an appendix to the IRM WP.

### 7.1 Decontamination

To avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Roux's SOPs for the Decontamination of Field Equipment located in Appendix A. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

### 7.2 Waste Handling and Disposal

All waste materials (decontamination water, etc.) generated during the system start-up will be consolidated, and stored in appropriate labeled bulk containers (drums, etc.), and temporarily staged at an investigation derived waste storage area on-site. Roux will then coordinate waste characterization and disposal by appropriate means.

**TABLES**

1. Field and Laboratory QC Summary
2. Remedial Investigation Sampling Summary
3. Preservation, Holding Times, and Sample Containers

**Table 1. Field and Laboratory QC Summary**

<b>QC Check Type</b>	<b>Minimum Frequency</b>	<b>Use</b>
<u>Field QC</u> Duplicate	1 per matrix	Precision
<u>Laboratory QC</u> Laboratory Duplicate	1 per matrix per SDG	Precision

**Notes:**

\* SDG - Sample Delivery Group - Assumes a single extraction or preparation

**Table 2. Investigation Sampling Summary**

<b>Sample Medium</b>	<b>Target Analytes</b>	<b>Field Samples</b>	<b>Replicates<sup>1</sup></b>	<b>Trip Blanks</b>	<b>Field Blanks</b>	<b>Matrix Spikes</b>	<b>Spike Duplicates</b>	<b>Total No. of Samples</b>
Indoor Air, Sub-slab vapor, Ambient Air	TO-15 VOCs	10	1	-	-	-	-	11

Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.

<sup>1</sup>Based on 1 per 20 samples

VOCs - Volatile Organic Compounds

**Table 3. Preservation, Holding Times and Sample Containers**

<b>Analysis</b>	<b>Matrix</b>	<b>Bottle Type</b>	<b>Preservation</b>	<b>Holding Time(a)</b>
TO-15	Air	2.7 liter Summa Canister	None	14 days from sample collection

<sup>(a)</sup> Days from date of sample collection.

Standard Operating Procedures

Date: May 5, 2000

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## 1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during drilling, and soil and water sampling. The objective of decontamination is to ensure that all drilling, and soil-sampling and water-sampling equipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements and because of variability in the requirements of individual states. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non-acceptance (invalidation) of the work undertaken and data collected.

## 2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

- 2.1 The rig and all associated equipment should be properly decontaminated by the contractor before arriving at the test site.
- 2.2 The augers, drilling casings, rods, samplers, tools, rig, and any piece of equipment that can come in contact (directly or indirectly) with the soil, will be steam cleaned onsite prior to set up for drilling to ensure proper decontamination.
- 2.3 The same steam cleaning procedures will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the study.
- 2.4 All on-site steam cleaning (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc.
- 2.5 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

- 2.6 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federal procedures.

### 3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

- 3.1 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.
- 3.2 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCBs) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).
- 3.3 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.
- 3.4 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.
- 3.5 Scrub all equipment in the bucket with a brush to remove any adhering particles.
- 3.6 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.
- 3.7 Place clean equipment on a clean plastic sheet (e.g., polyethylene)
- 3.8 Reassemble the cleaned sampler, as necessary.
- 3.9 Transfer the sampler to the driller (or helper) making sure that this individual is also wearing clean gloves or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil).

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

#### 4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

##### 4.1 Decontamination procedures for bailers follow:

- a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.
- b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.
- c. Disassemble bailer (if applicable) and discard cord in an appropriate manner and scrub each part of the bailer with a brush and solution.
- d. Rinse with potable water and reassemble bailer.
- e. Rinse with copious amounts of distilled or deionized water.
- f. Air dry.
- g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).
- h. Rinse bailer at least three times with distilled or deionized water before use.

##### 4.2 Decontamination procedures for pumps follow:

- a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.
- b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.
- c. Flush the pump and discharge hose (if not disposable) with the detergent solution and discard disposable tubing and/or cord in an appropriate manner.
- d. Flush the pump and discharge hose (if not disposable) with potable water.
- e. Place the pump on clear plastic sheeting.
- f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

- g. Air dry.
- h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX D**

Sub-Slab Depressurization System Operations and Maintenance Log

## SUB-SLAB DEPRESSURIZATION SYSTEM OPERATIONS AND MAINTENANCE FORM

Site Name: <u>148 Nagle Site - Offsite SSDS (156 Nagle)</u> Street Address: <u>156 Nagle Avenue</u> Location: <u>Manhattan, NY</u> System: <u>Active Sub-Slab Depressurization System</u> Blower: _____ Blower Range: _____	Inspection Date: _____  Inspection Personnel: _____ _____
--	--

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 blower enclosure in good condition?	___	___	_____
Are the valves (at blower and aboveground piping) in good condition?	___	___	_____
Is the vacuum filter in good condition?	___	___	_____
Does the knock-out tank need to be drained? (Record amount drained)	___	___	_____
Are aboveground piping free of cracks, leaks, and support issues?	___	___	_____
Are vacuum/pressure gauges at blower operating properly?	___	___	_____
Are interior piping free of cracks, leaks, and support issues?	___	___	_____

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

Blower Influent	Vacuum (in. w.c.)	Comments

Blower Effluent	Pressure (in. w.c.)	Comments

Soil Vapor Monitoring Point*	Vacuum (in. w.c.)	Comments
SV-1		
SV-2		

PERFORM THE FOLLOWING ONLY IF A VACUUM READING AT THE SVMPS IS LESS THAN 0.004 IN. W.C.

INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Are interior vacuum gauges operating properly?	___	___	_____

Suction Point*	Vacuum (in. w.c.)	Comments
SS-A		
SS-B		
SS-C		
SS-D		

in. w.c. - inches of water  
 \* Refer to Drawing 1 for locations of Soil Vapor Monitoring Points and Suction Points

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX E**

Health and Safety Plan



# Site-Specific Health and Safety Plan

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148 and 156 Nagle Avenue  
Manhattan, New York

June 17, 2022

Prepared for:

**Dyckman Crestview Realty, LLC**  
13 Harding Terrace  
Morristown, New Jersey 07960

Prepared by:

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

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- H. Heavy Equipment Exclusion Zone Policy

# 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 on-site personnel.

Emergency Contact Information			
Site Personnel			
Title	Contact	Telephone	
Office Manager (OM)	Brian Morrissey	631-630-2330 631-921-6355	
Project Principal (PP)	Frank Cherena	631-630-2388 631-445-0357	
Project Manager (PM)	Rachel Henke	631-630-2334 919-619-1503	
Site Supervisor (SS)	Rachel Henke	631-630-2334 919-619-1503	
Site Health and Site Safety Officer (SHSO)	Shannon Edmonds	703-244-4270	
Office Health and Safety Manager (OHSM)	Brian Hobbs	631-630-2419 631-807-0193	
Corporate Health and Safety Manager (CHSM)	Brian Hobbs	631-630-2419 631-807-0193	
AllOne Health	Occupational Health Care Management Provider	800-350-4511	
Outside Assistance			
Agency	Contact	Telephone	Address/Location
Ambulance/emergency medical services (EMS)	911	911	
Police	34 <sup>th</sup> Precinct NYPD	212-927-9711	4295 Broadway, New York, NY 10033
Fire	FDNY Engine 95	718-999-2000	29 Vermilyea Ave, New York, NY 10034
Site Address	148 and 156 Nagle Avenue, Manhattan, NY		

### **Emergency Medical Facility**

Bronx Lebanon Hospital

1650 Grand Concourse, Bronx, NY 10457

1. Head west on Nagle Ave toward Thayer St
2. Turn left onto US-9 S/Broadway
3. Turn left onto W 183<sup>rd</sup> St
4. Turn right onto Amsterdam Ave
5. Turn left onto Washington Bridge
6. Take the ramp on the left for I-95 North and head toward Eastern LI
7. Take exit 2A and follow the signs for Jerome Ave
8. Turn right onto Jerome Ave
9. Turn left onto E Mount Eden Ave
10. Keep straight to get onto Mount Eden Parkway
11. Turn left onto Grand Concourse
12. Destination is on the right

### **Urgent Care Facility**

181 Urgent Care Center

521 W 181<sup>st</sup> St, New York, NY 10033

1. Head west on Nagle Ave toward Thayer St
2. Turn left onto US-9 S / Broadway
3. Turn left onto W 183<sup>rd</sup> St
4. Turn left onto Amsterdam Ave
5. Turn right onto W 181<sup>st</sup> St
6. Destination on the right

# 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 an SSDS installation located at 148 and 156 Nagle Avenue, Manhattan, New York. 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 well decommissioning 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. Additionally, subcontractors may be required to submit their own HASP as it relates to their specific work activities and will be kept onsite during such work.

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, Site Supervisor (SS), and Site Health and Safety Officer (SHSO) for this project is Douglas Ferraiolo.

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 SSHO;
- Ensuring effective emergency response through coordination with the Emergency Response Coordinator (ERC); and
- Serving as primary Site liaison with public agencies and officials and Site contractors.

### Site Health and Safety Officer (SHSO)

The SHSO has the 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; and
- 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; and
- 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; and
- Providing copies of all Safety Data Sheets (SDS) to Roux SHSO for materials brought to the Site.

## **2. Background**

### **2.1 Site Description**

The 148 Nagle Site is comprised of a single tax parcel (Block 2174, Lot 70) totaling 10,000 square feet (0.175 acres). The Site has approximately 100 feet of street frontage along Nagle Avenue and 100 feet of street frontage along Thayer Street. The Site is currently improved with a one-story 2,000 square foot (sf) commercial building occupied by a laundromat. Previously, a one-story 6,000 sf retail building was also present on the property, and one of the tenants was a dry cleaner. The 6,000 sf building was destroyed in a fire in November 2017. There was onsite storage of liquid PCE at the dry cleaner that was ruptured and released during the fire and the subsequent building demolition. The vertical extent of soil contamination within the former dry-cleaning unit extends below the slab to a depth of 25 ft. This likely occurred as residual solvent or highly-impacted water migrated through the cracked slab, which is still present at the Site approximately 10 feet below grade. The cellar level of the 6,000 sf building was filled in following the fire and subsequent building demolition.

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

The property located at 156 Nagle Avenue is adjacent to the 148 Nagle site, and contaminants from the 148 Nagle Site appear to be migrating beneath the 156 Nagle Avenue property. Based upon previous investigations conducted to date, the primary contaminants of concern for the Site include chlorinated volatile organic compounds (CVOCs) in soil, soil vapor, and indoor air.

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

Roux Environmental Engineering and Geology, D.P.C. (Roux) will oversee an SSDS installation located at 156 Nagle Avenue, Manhattan, New York.

The Scope of Work (SOW) for the IRM consists of the following tasks:

- Site mobilization and Site preparation;
- Installation of the SSDS components;
- Indoor and ambient air sampling;
- Waste disposal (assumed to be minimal); and
- Documentation.

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 work areas at 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 PRC's construction division when the Site is in operation or not.

### 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: visual hand signals will be used during use of all heavy equipment, and workers will have cell phones on-Site.

As applicable, 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 included in the Site-Specific Emergency Information at the beginning of this HASP.

## **4.5 Site Work Zones**

This Site is divided into three (3) major zones, described below. These zones are characterized by the likely 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 part of the EZ. This zone will be clearly delineated by chain link fencing, caution tape, cones or other effective barriers, as necessary. 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; and
- 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. 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 on-going 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**.

## 5.2 Noise

Noise is associated with the operation of heavy equipment, power tools, pumps, and generators. Noise is also a potential hazard when working near operating equipment such as excavators, drill rigs or pole drivers. High noise (i.e., < 85 dBA) operations may be evaluated by the SHSO utilizing a type 2 handheld sound level meter (SLM) operating on the “A”-weighted scale with slow response because this scale most closely resembles human response to noise and complies with OSHA 29 CFR 1910.95. Hearing protection is required in areas with noise exposure greater than 85 dBA. Double hearing protection (ear plugs and earmuffs) are required in areas where the noise exposure is more than 95 dBA. Noise exposure will be controlled by hearing protection as described above or by maintaining set-backs from high-noise equipment, as warranted. Personnel handling heavy equipment and using power tools that produce noise levels exceeding those described levels above are required by OSHA 29 CFR 1910.95 to wear the appropriate Noise Reduction Rating (NRR) level of hearing protection. Appropriate hearing protection will be evaluated by the SHSO as necessary in consultation with the OHSM and CHSM.

## 5.3 Biological Hazards

Biological hazards that may potentially be present at a Site, include poisonous plants, insects (ticks, spiders, bees), animals (snakes, dogs), etc. Information on biological hazards can be found within Roux’s Biological Hazard Awareness Management Program located within Roux’s Corporate Health and Safety Manual. There is also potential for transmission and/or exposure to SARS-CoV-2, the virus that causes COVID-19. Prior to beginning work, on-Site protocols shall be established by the project team, including subcontractors, in accordance with federal, state, county, city, and/or other guidance, as applicable and consistent with **Appendix C**. Government guidance/orders generally consist of implementation of the following protocols/procedures (or some variation thereof):

- Self-monitoring for symptoms;
- Fitness check for work each day;
- Limiting businesses to “essential” operations;
- Social distancing (generally 6 feet);
- Cloth face masks/ coverings;
- Hand washing/ disinfectant use; and
- Care / awareness of surroundings (public spaces, equipment, hotel rooms, rental cars).

Additional guidance on minimizing potential exposure to SARS-CoV-2, including a JSA, are included in **Appendix C**.

## 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 point. If any worker cannot be accounted for, notification is given to the SHSO, PM, and any arriving response authorities 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

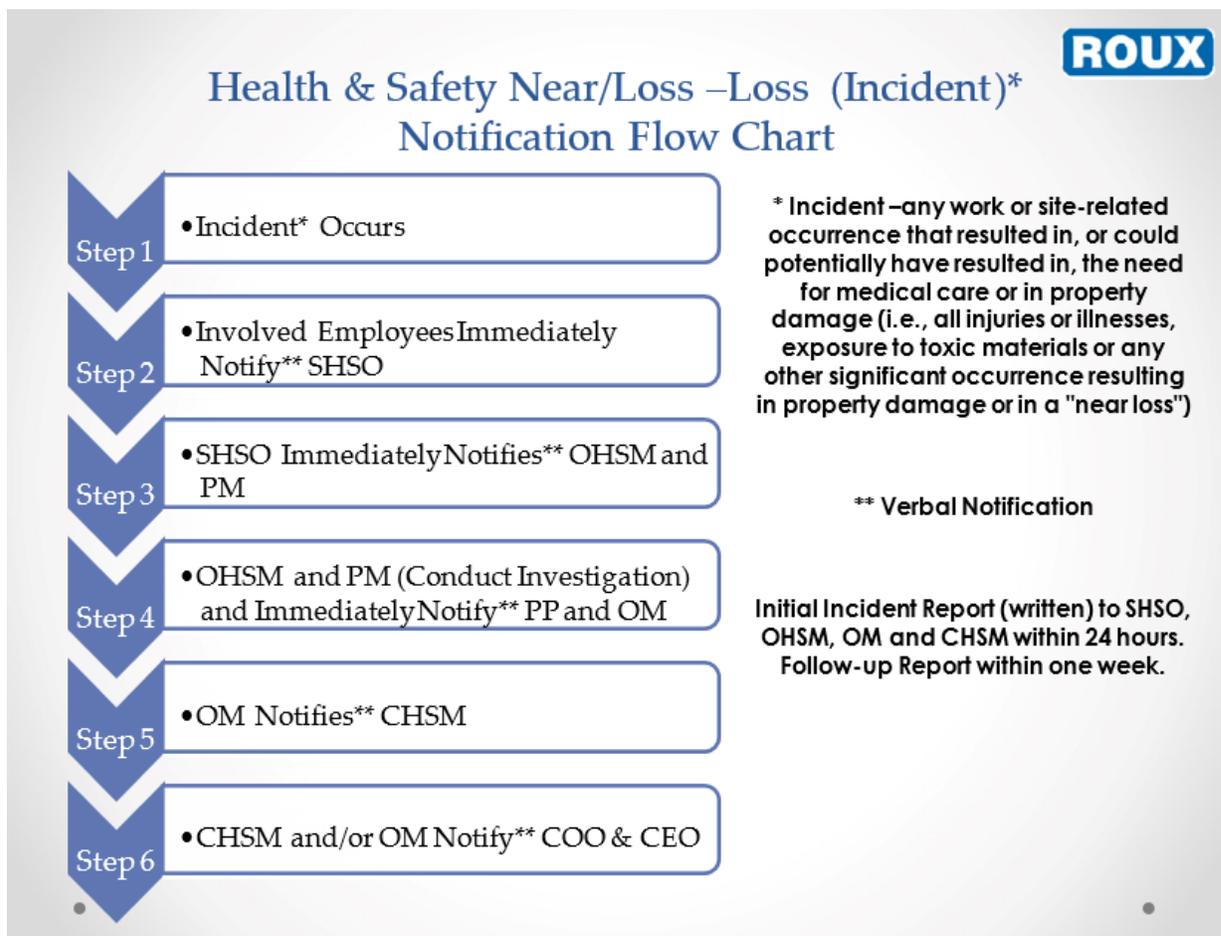
In the event of a work-related injury or illness, employees are required to follow the procedures outlined below. All work-place injury and illness situations require Roux's Project and Corporate Management Team to be notified when an injury/illness incident occurs, and communication with the contracted 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 NYC Health + Hospitals/Woodhull and CityMD Broadway Triangle Urgent Care 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; and
- 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 on-Site 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 employees are familiar with this HASP and the information and requirements it contains, as well as the relevant JSAs included in **Appendix A**. Additional briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during on-going Site characterization and analysis of changing conditions. 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); and
- 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; and
- 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 D**. 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. 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); and
- 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. 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 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 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 < 5 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

<sup>1</sup> 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.

<sup>1</sup> 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 multi-gas meter will be used to monitor the worker’s breathing zone throughout the day. 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’s Standard Operating Procedures (SOPs). Conformance with these guidelines as well as the guidelines described in this HASP 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 the SS/SHSO. 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**

In coordination with the SS/SHSO, Douglas Ferraiolo, PM 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 CRZ at this site, if applicable.

### **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 SZ 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 EZ or CRZ are decontaminated in the CRZ prior to removal to the SZ. 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 SZ 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 EZ 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

No confined space entry is anticipated for this scope of work.

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, diving, etc.

## 7.13 Activity-Specific Hazards

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 7.13.3 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 E**.

### 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 F**. 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

## 7.14 Heat Stress

The National Oceanic and Atmospheric Administration records average minimum/maximum temperatures of 23/85 degrees Fahrenheit, respectively, during the year in Manhattan, New York.

### 7.14.1 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.

### 7.14.2 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.

### 7.14.3 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 when worn in hot weather environments.

### 7.15 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.



## 9. Approvals

By their signature, the undersigned certify that this HASP is approved and will be utilized at the 148 and 156 Nagle Avenue site.

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Shannon Edmonds – Site Health and Safety Officer

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Date

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Brian Hobbs – Office Health and Safety Manager

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Date

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Rachel Henke – Project Manager

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Date

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Frank Cherena, P.G. – Project Principal

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Date

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**TABLES**

1. Toxicological Properties of Hazardous Substances Present at the Site

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 148 and 156 Nagle Avenue, Manhattan, NY.**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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
Acenaphthylene	208-96-8	None Established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Yellow Solid Fl. Pt.=251°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: sliver-gray or tin-white, brittle, odorless solid BP: sublimes
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, digestive 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 ST 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 [skin cancer]	None established	None established	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	Irritation eyes, skin, respiratory system, CNS; skin cancer	Skin	Pale Yellow crystal, solid BP: 438 C
Benzo[a]pyrene	50-32-8	None established [cancer]	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 [cancer]	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
Benzo(g,h,i)perylene	191-24-2	None established	None established	California permissible exposure limits for chemical contaminants (Title 8, Article 107) PEL 0.2 mg/m <sup>3</sup>	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory tract, very toxic to aquatic life with long lasting effects	Eyes, skin, respiratory system	Pale Yellow -Green Crystals BP: 550°C
Beryllium	7440-41-7 (metal)	TWA 0.00005 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
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
Carbon Tetrachloride	56-23-5	TWA 5 ppm STEL 10 ppm	Ca ST 2 ppm (12.6 mg/m <sup>3</sup> ) [60 minute]	TWA 10 ppm C 25 ppm 200 ppm (5-minute maximum peak in any 4 hours)	Ca [200 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]	central nervous system, eyes, lungs, liver, kidneys, skin	Colorless liquid with a characteristic ether-like odor. BP: 170°F
Carbon Monoxide	630-08-0	TWA 25 ppm	TWA 35 ppm C 200 ppm	TWA 50 ppm	1,200 ppm	inhalation	Carboxyhemogloemia	Blood	Colorless, odorless gas

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 148 and 156 Nagle Avenue, Manhattan, NY.**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
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 VI 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
Coal Tar Pitch Volatiles; Chrysene; Phenanthrene; Pyrene	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
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 F.I.P: 2°F UEL: 11.4% LEL: 5.4%
1,2-Dichloroethane (Ethylene Dichloride)	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 F.I.P: 56°F UEL: 16% LEL: 6.2% Class IB Flammable Liquid
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm	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 F.I.P: 36-39°F UEL: 12.8% LEL: 5.6% Class IB Flammable Liquid
cis-1,2-Dichloroethene	156-59-2	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.I.P: 4 C UEL: 12.8% LEL: 9.7 %
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 F.I.P 6C UEL: 12.8% LEL: 9.7%
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
Dibenzofuran	132-64-9								
Diesel Fuel #2	68476-34-6	TWA 100 mg/m <sup>3</sup> ; Skin notation	None established	Designated as an OSHA Select Carcinogen	None established	ingestion, skin and/or eye contact	Kidney damage; potential lung damage; suspected carcinogen; irritation of eyes, skin, respiratory tract; dizziness, headache, nausea; chemical pneumonitis (from aspiration of liquid); dry, red skin; irritant contact dermatitis; eye redness, pain.	Eyes, skin, kidneys	Clear yellow brown combustible liquid; floats on water; distinct diesel petroleum hydrocarbon odor. BP: 356-716°F F.I.P: 154.4-165.2°F LEL: 0.6% UEL: 7.0%
Ethylbenzene	100-41-4	TWA 20 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 F.I.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.

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 148 and 156 Nagle Avenue, Manhattan, NY.**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Fuel Oil #2	68476-30-2	TWA 100 mg/m <sup>3</sup> ; Skin notation	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% Class 1B Flammable Liquid
Hydrogen Sulfide	7783-06-4	TWA 1 ppm STEL 5 ppm	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
Lead (inorganic)	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
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
Methylene Chloride (Dichloromethane)	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%
Naphtha (Rubber Solvent)	8030-30-6	None established	TWA 100 ppm (400 mg/m <sup>3</sup> )	TWA 100 ppm (400 mg/m <sup>3</sup> )	1000 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; dizziness, drowsiness; dermatitis; in animals: liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Reddish-brown, mobile liquid with an aromatic odor BP: 320-428°F Fl.P: 100-109°F Class II Combustible Liquid
Naphthalene	91-20-3	TWA 10 ppm [skin]	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%
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
Polychlorinated Biphenyls (PCBs) (Chlorodiphenyl (42% Chlorine))	53469-21-9	TWA 1 mg/m <sup>3</sup>	Ca TWA 0.001 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	5 ppm	Dermal; inhalation; ingestion; skin and/or eye contact	Irritation eyes; chloracne; liver damage; reproductive effects; [potential occupational carcinogen]	Eyes, skin, liver, respiratory system	Colorless to light-colored, viscous liquid, hydrocarbon odor, BP: 617 - 734°F, non-flammable, LEL: NA, UEL: NA
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

**Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 148 and 156 Nagle Avenue, Manhattan, NY.**

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Silver	7440-22-4 (metal)	TWA 0.1 mg/m <sup>3</sup> (metal, dust, fume) 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
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm 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
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 F.I.P: 40°F UEL: 7.1% LEL: 1.1% Class IB Flammable Liquid
1,1,1-Trichloroethane (Methyl Chloroform)	71-55-6	TWA 350 ppm STEL 450 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 arrhythmias; liver damage	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%
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 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 F.I. 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 Oxide	1314-13-2	TWA 2 mg/m <sup>3</sup> STEL 10 mg/m <sup>3</sup>	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

**References**

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 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.  
 2017 TLVs® and BEIs®, American Conference of Industrial Hygienists

**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.  
 CAS# - Chemical Abstracts Service registry number which is unique for each chemical.  
 Ft 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 effects.  
 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  
 SG - Specific Gravity  
 STEL – Short-term exposure limit (ST)  
 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)  
 VP - Vapor Pressure

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**FIGURES**

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



**QUADRANGLE LOCATION**



SOURCE:  
USGS; 2013, Central Park, NY  
7.5 Minute Topographic Quadrangle

Title:

**SITE LOCATION MAP**

148 AND 156 NAGLE AVENUE  
MANHATTAN, NEW YORK

Prepared for:

DYCKMAN CRESTVIEW REALTY



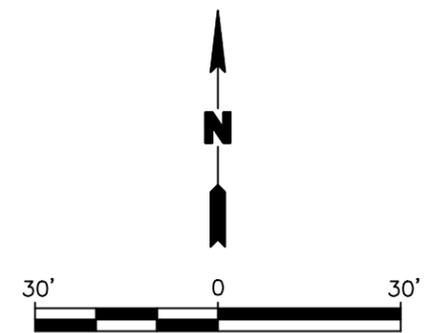
Compiled by: H.M.	Date: 01JUN22
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: R.H.	Project: 3770.0001Y000
File: 3770.0001Y111.01.cdr	

FIGURE

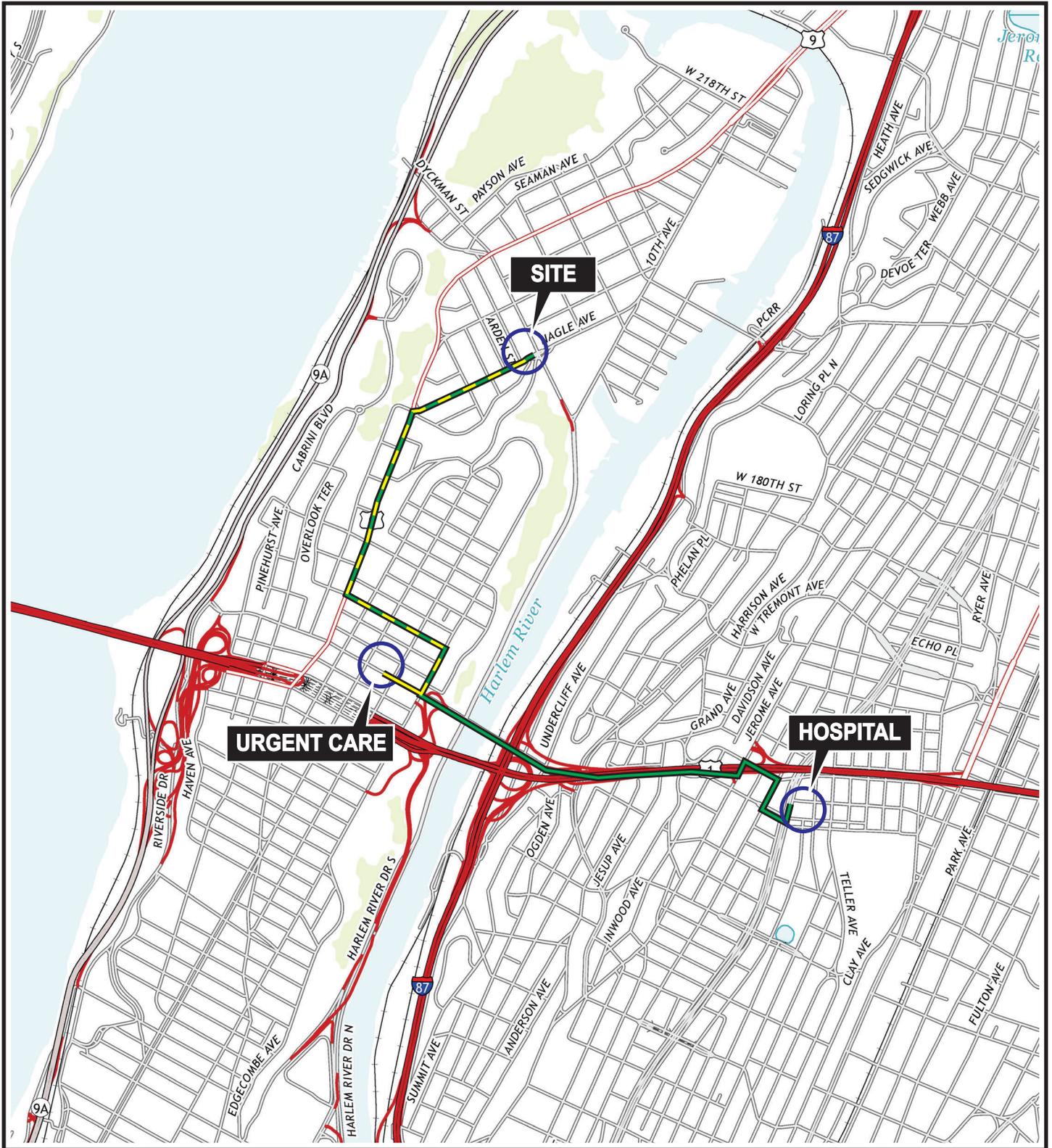
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Title:			<b>SITE PLAN WITH EMERGENCY MUSTER AREA</b>
148 AND 156 NAGLE AVENUE MANHATTAN, NEW YORK			
Prepared for:			DYCKMAN CRESTVIEW REALTY
<b>ROUX</b>	Compiled by: H.M.	Date: 01JUN22	FIGURE <b>2</b>
	Prepared by: G.M.	Scale: AS SHOWN	
	Project Mgr: R.H.	Project: 3770.0001Y000	
	File: 3770.0001Y111.02.DWG		



**Directions to Bronx Lebanon Hospital, 1650 Grand Concourse, Bronx**

1. Southwest on Nagle Ave., then turn left onto Broadway.
2. Turn left onto W 184th St. then turn right onto Amsterdam Ave.
4. Turn left onto McNally Plaza/Washington Bridge.
5. Keep left at fork, follow signs for I-95 N/Cross Bronx Expy/ New England/Eastern LI and merge onto I-95 N/Cross Bronx Expy.
6. Take exit 2A for Jerome Ave.
7. Keep left at fork to continue toward Jerome Ave.
8. Turn left onto Jerome Ave. then turn right onto E 174th St.
9. Turn right onto Walton Ave. then turn left onto E Mt Eden Ave.
10. Turn left onto Grand Concourse. Hospital on right.

**Directions to 181 Urgent Care Center, 521 W 181st Street, New York**

1. Southwest on Nagle Ave., then turn left onto Broadway.
2. Turn left onto W 184th St. then turn right onto Amsterdam Ave.
4. Turn right onto W 181st St. Urgent care on right.



Title:

**HOSPITAL AND URGENT CARE ROUTE MAP**

148 AND 156 NAGLE AVENUE  
MANHATTAN, NEW YORK

Prepared for:

DYCKMAN CRESTVIEW REALTY



Compiled by: H.M.	Date: 01JUN22
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: R.H.	Project: 3770.0001Y000
File: 3770.0001Y111.01.cdr	

FIGURE

**3**

**Site-Specific Health and Safety Plan**  
**148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDICES**

- A. Job Safety Analysis (JSA) Forms
- B. SDSs for Chemicals Used
- C. COVID-19 Interim Health and Safety Guidance
- D. Incident Investigation and Reporting Management Program
- E. Personal Protective Equipment (PPE) Management Program
- F. New York State Department of Health (NYSDOH) Generic Community Air Monitoring Program (CAMP)
- G. Subsurface Utility Clearance Management Program
- H. Heavy Equipment Exclusion Zone Policy

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**APPENDIX A**

Job Safety Analysis (JSA) Forms

JOB SAFETY ANALYSIS Ctrl. No. CVD-19		DATE: 06/11/2021	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>	WORK TYPE <b>Fieldwork</b>	WORK ACTIVITY (Description) <b>Working in Areas Affected by Coronavirus</b>		
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Kristina DeLuca	Health and Safety Specialist	Brian Hobbs	CHSD	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT – In field <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES – In field	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES – Steel/composite toe in fie	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING – High visibility vest in field	<input checked="" type="checkbox"/> GLOVES – Leather/cut-resistant in field and nitrile as needed <input type="checkbox"/> OTHER	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
Cloth face covering, nitrile gloves, hand soap, water source, hand sanitizer, disinfectant spray and disinfectant wipes.				
<b>Commitment to Safety – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.</b>				
<b>SOCIAL DISTANCING: Maintain 6' of distance between yourself and all other people at all times. If you do not believe the scope of work can be conducted while maintaining this distance, contact your Project Manager immediately.</b>				
Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS		
1. Project Preplanning	N/A	<ul style="list-style-type: none"> <li>Review and follow COVID-19 CDC, Roux, Client and local orders/protocols.</li> <li>Ensure all workers are fit for duty - anyone feeling sick should remain at home even if symptoms do not align with COVID-19. If a worker has been in contact with someone potentially positive or positive for COVID-19, contact your Office Manager.</li> <li>Determine PPE needs and ensure adequate supply of disinfectant wipes/spray, soap and water or hand sanitizer at Site. Due to high demands and limited supply, plan ahead.</li> <li>Use the minimum number of employees necessary to safely complete the work.</li> </ul>		
2. Mobilization	<b>Exposure:</b> Becoming infected or infecting co-workers	<p><b>Personal/Rental/Roux Owned Vehicle</b></p> <ul style="list-style-type: none"> <li>Do not carpool, unless all individuals are fully vaccinated.</li> <li>Verify workers/other people are not approaching vehicle prior to exiting the vehicle. Maintain 6' of distance from general public, as appropriate.</li> </ul> <p><b>Public Transportation</b></p> <ul style="list-style-type: none"> <li>Public transit should not be used unless absolutely necessary. Consider renting a car rather than taking public transit. If public transit is required, wear appropriate face covering/mask and apply social distancing (6 ft). Wash hands or use hand sanitizer immediately after.</li> </ul> <p><b>Hotel Stay (Refer to COVID-19 H&amp;S Guidance for more info)</b></p> <ul style="list-style-type: none"> <li>If a hotel stay is deemed necessary for the given field work, ensure that you clean your room upon initial arrival.</li> <li>Place the "Do Not Disturb" placard on the room while away and limit housekeeping services to the extent feasible during your stay to minimize the reintroduction and spread of the virus from others.. Wash hands or use hand sanitizer often.</li> </ul>		
3. Tailgate Meeting	<b>Exposure:</b> Becoming infected or infecting co-workers	<ul style="list-style-type: none"> <li>Perform outside or indoors in areas with ample ventilation.</li> <li>If unvaccinated, maintain at least a 6+ ft distance between you and others.</li> <li>Discuss primary infection prevention measures listed below.</li> <li>Discuss COVID-19 symptoms with coworkers and subcontractors to ensure fitness for duty. Anyone exhibiting signs or symptoms should be instructed to leave the Site, contact your Project Manager.</li> </ul>		

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<sup>2</sup> A hazard is a potential danger. Break hazards into six 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; 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".

4. Site Activities	<p><b>Exposure:</b> Becoming infected or infecting co-workers</p>	<ul style="list-style-type: none"> <li>• Coordinate field activities at the beginning of the day (i.e. Tailgate meeting) to minimize time spent in crowded spaces or overlap while completing job tasks.</li> <li>• Don cloth face coverings as appropriate.</li> <li>• Apply social distancing (6+ ft) when interacting with others if unvaccinated. If anyone comes within 6 ft of you while conducting work and your work prevents you from moving away, politely ask them to move back. If others are unable to move from your space, stop work and leave area.</li> <li>• Minimize shaking hands or touching others.</li> <li>• Minimize sharing of equipment or other items with co-workers and subcontractors unless wearing appropriate PPE (e.g. nitrile gloves), as appropriate.</li> <li>• If anyone is experiencing COVID-19 signs or symptoms in your vicinity, stop work and leave the area.</li> <li>• Do not work in areas with limited ventilation with others.</li> <li>• Cover your mouth and nose with tissue or paper towel or with your elbow when coughing or sneezing and wash hands or use hand sanitizer immediately after. If sick contact SHSO/PM and leave Site immediately.</li> <li>• Clean work surfaces/areas with approved cleaners you're responsible for (ex: desk, office doorknob, computer, etc.) at least daily.</li> <li>• Avoid public spaces and going out to eat by bringing your own lunch to the Site. If performing work in high density urban areas, it is recommended all food must be consumed at or in your vehicle or within designated work trailer. Wash hands or use hand sanitizer before eating and immediately after.</li> </ul>
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#### Primary Infection Prevention Measures

- Wash your hands often with soap and water for at least 20 seconds.
  - If soap and water are not available, use an alcohol-based sanitizer that contains at least 60% alcohol. Key times to wash hands include after blowing your nose, coughing or sneezing, after using the restroom, and before eating or preparing food.
- Do not touch your eyes, face, nose and mouth with unwashed hands.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw potentially contaminated items (e.g. used tissues) in the trash.
- Avoid close contact/secondary contact with people and potentially contaminated surfaces.
  - Apply appropriate social distance (6+ feet).
  - Minimize handshaking/touching others and use caution when accessing public spaces.
- Clean frequently touched surfaces daily. Commonly touched items can include but are not limited to tables, doorknobs, light switches, countertops, handles, desks, phones, keyboard, toilets, sinks and field equipment. If surfaces are dirty, they should be cleaned with soap and water prior to disinfection. If surface cannot be cleaned/disinfected, then wash hands or use sanitizer as soon as possible.

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<sup>2</sup> A hazard is a potential danger. Break hazards into six 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".

JOB SAFETY ANALYSIS		Ctrl. No. GEN-005	DATE 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>GENERIC</b>	WORK TYPE <b>Construction</b>	WORK ACTIVITY (Description) <b>Cutting with Gas-powered Saw, Sawzall or Plasma Cutter</b>			
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>		<b>POSITION / TITLE</b>	
Ray Greenidge	Office Health and Safety Manager	Brian Hobbs		Corporate Health & Safety Manager	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<input checked="" type="checkbox"/> REFLECTIVE 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 (gas powered saw and plasma cutter) <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel-toed boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent Long sleeved shirt</u> and / or reflective safety vest	<input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant, leather, nitrile</u> <input checked="" type="checkbox"/> OTHER: Chaps for gas powered saw. Welding suit for plasma cutting.		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Sawzall/extension cord					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>			
1. Set up/ Secure work area.	1a. <b>CONTACT:</b> Personnel could enter the work area	1a. Establish the work zone using 42" cones, caution tape, or fixed rigid barrier. Inform others of work activity.			
2. Precutting procedure.	2a. <b>CONTACT:</b> Improper blade, malfunctioning guards, unsecured materials, flying debris  2b. <b>EXPOSURE:</b> Loud noises, dust, bright UV light  2c. <b>ENERGY SOURCE:</b> Potential for electric shock	2a. Inspect all equipment for defects, replace or service if not functioning optimally. Check that all guards are working and in place, replace if missing. Ensure that blades are sharp and clean to avoid binding and/or burning. Cut on flat/secure work surfaces. Do not cut badly warped wood or boards with knots or nails.  2a. Unplug saw before handing it off to another person.  2a. Wear safety glasses, long-sleeved shirt and leather gloves. Utilize job specific PPE such as welding jacket or chaps when using gas powered saw or a plasma cutter.  2b. When using gas powered saw, wet down area to be cut prior to cutting if high dust levels are anticipated.  2b. Wear hearing protection. Wear a dust mask if large amounts of dust are expected; cut upwind if possible.  2b. When plasma cutting, wear a face shield with shaded glasses rated to block UV light generated by the plasma cutter.  2c. Inspect extension cord for damage. If damaged, tag out and repair / replace. Do not operate saw while standing in water. Ensure GFCI protection at outlet or via attachment.  2c. Ensure all electrical equipment is rated for the task.			

<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 six 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 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS
3. Saw Cutting.	<p><b>3a. CONTACT:</b> Fingers could be cut, lacerated or amputated by reciprocating blade; also flying debris and sparks</p> <p><b>3b. CONTACT:</b> Amputation and line of fire injury.</p> <p><b>3c. FALL:</b> Tripping hazards caused by cutting/grinding debris, extension cords.</p> <p><b>3d. EXERTION/ERGONOMICS:</b> Lifting heavy or awkward materials may cause muscle strain.</p> <p><b>3e. EXPOSURE:</b> Personnel may be exposed to fire hazard during Hot Work Activities.</p>	<p>3a. Cut away from body. Keep fingers away from moving blade. No loose clothing. Never leave saw running unattended. Unplug saw before changing blades or making adjustments / repairs. Set-up barrier to contain sparks. Cut on flat/secure work surfaces.</p> <p>3a. Wear Safety glasses</p> <p>3a. Ensure that the saw blade stops rotating/reciprocating before placing saw on the ground.</p> <p>3b. Maintain a minimum 15-foot exclusion zone and ensure that operator and other personnel are kept out of the line-of- fire of the equipment.</p> <p>3c. Keep debris generated in designated storage containers. Keep work area free of Slip, Trip and Fall hazards.</p> <p>3c. Do not route extension cords through walking/working path.</p> <p>3d. Maintain Proper Body Position while operating lifting and moving with equipment. Keep load close to body, knees bent, and back straight.</p> <p>3d. Take frequent breaks or switch personnel if cutting for an extended period of time.</p> <p>3e. Complete Hot Work Permit, Designate Fire Watch.</p> <p>3e. Conduct work zone inspection:</p> <ul style="list-style-type: none"> <li>- Verify that all combustible or flammable materials or equipment fuel sources have been removed from within 35 feet of the proposed hot work.</li> <li>- If combustible or flammable materials or equipment fuel sources have not been removed from within 35 feet of the hot work, verify that engineering and procedural controls have been emplaced: curtains, blankets, wetting, ventilation.</li> </ul> <p>3e. Two 20-lb. Type ABC Fire extinguishers required.</p> <p>3e. Conduct continuous air monitoring / Lower Explosive Limit (LEL) screenings. Action Level: 10% of the LEL.</p> <p>3e. If ambient air concentrations exceed LEL Action Levels, STOP WORK and contact supervisor.</p> <p>3e. Wear hard hat, long sleeved-shirt and safety glasses. Utilize job specific PPE such as welding jacket or chaps and welding glasses when using gas powered saw or a plasma cutter.</p>
4. Secure area when leaving tools unattended.	<p><b>4a. CONTACT:</b> Unauthorized personnel may enter the work area</p> <p><b>4b. FALL:</b> Slip/trip/fall</p>	<p>4a. Unplug saw when not being used. Store equipment in designated storage areas when not being used.</p> <p>4b. Store tool in designated storage location when it is not being used, secure all extension cords, keep all equipment out of walkways.</p> <p>4b. Keep work area free of Slip, Trip and Fall Hazards.</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 six 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.

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JOB SAFETY ANALYSIS		Ctrl. No. GEN-005	DATE 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>GENERIC</b>	WORK TYPE <b>Construction</b>	WORK ACTIVITY (Description) <b>Cutting with Gas-powered Saw, Sawzall or Plasma Cutter</b>			
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>		<b>POSITION / TITLE</b>	
Ray Greenidge	Office Health and Safety Manager	Brian Hobbs		Corporate Health & Safety Manager	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<input checked="" type="checkbox"/> REFLECTIVE 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 (gas powered saw and plasma cutter) <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel-toed boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent Long sleeved shirt</u> and / or reflective safety vest	<input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant, leather, nitrile</u> <input checked="" type="checkbox"/> OTHER: Chaps for gas powered saw. Welding suit for plasma cutting.		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Sawzall/extension cord					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>			
1. Set up/ Secure work area.	<b>1a. CONTACT:</b> Personnel could enter the work area	1a. Establish the work zone using 42" cones, caution tape, or fixed rigid barrier. Inform others of work activity.			
2. Precutting procedure.	<b>2a. CONTACT:</b> Improper blade, malfunctioning guards, unsecured materials, flying debris  <b>2b. EXPOSURE:</b> Loud noises, dust, bright UV light  <b>2c. ENERGY SOURCE:</b> Potential for electric shock	2a. Inspect all equipment for defects, replace or service if not functioning optimally. Check that all guards are working and in place, replace if missing. Ensure that blades are sharp and clean to avoid binding and/or burning. Cut on flat/secure work surfaces. Do not cut badly warped wood or boards with knots or nails.  2a. Unplug saw before handing it off to another person.  2a. Wear safety glasses, long-sleeved shirt and leather gloves. Utilize job specific PPE such as welding jacket or chaps when using gas powered saw or a plasma cutter.  2b. When using gas powered saw, wet down area to be cut prior to cutting if high dust levels are anticipated.  2b. Wear hearing protection. Wear a dust mask if large amounts of dust are expected; cut upwind if possible.  2b. When plasma cutting, wear a face shield with shaded glasses rated to block UV light generated by the plasma cutter.  2c. Inspect extension cord for damage. If damaged, tag out and repair / replace. Do not operate saw while standing in water. Ensure GFCI protection at outlet or via attachment.  2c. Ensure all electrical equipment is rated for the task.			

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<sup>2</sup> A hazard is a potential danger. Break hazards into six 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 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS
3. Saw Cutting.	<p><b>3a. CONTACT:</b> Fingers could be cut, lacerated or amputated by reciprocating blade; also flying debris and sparks</p> <p><b>3b. CONTACT:</b> Amputation and line of fire injury.</p> <p><b>3c. FALL:</b> Tripping hazards caused by cutting/grinding debris, extension cords.</p> <p><b>3d. EXERTION/ERGONOMICS:</b> Lifting heavy or awkward materials may cause muscle strain.</p> <p><b>3e. EXPOSURE:</b> Personnel may be exposed to fire hazard during Hot Work Activities.</p>	<p>3a. Cut away from body. Keep fingers away from moving blade. No loose clothing. Never leave saw running unattended. Unplug saw before changing blades or making adjustments / repairs. Set-up barrier to contain sparks. Cut on flat/secure work surfaces.</p> <p>3a. Wear Safety glasses</p> <p>3a. Ensure that the saw blade stops rotating/reciprocating before placing saw on the ground.</p> <p>3b. Maintain a minimum 15-foot exclusion zone and ensure that operator and other personnel are kept out of the line-of- fire of the equipment.</p> <p>3c. Keep debris generated in designated storage containers. Keep work area free of Slip, Trip and Fall hazards.</p> <p>3c. Do not route extension cords through walking/working path.</p> <p>3d. Maintain Proper Body Position while operating lifting and moving with equipment. Keep load close to body, knees bent, and back straight.</p> <p>3d. Take frequent breaks or switch personnel if cutting for an extended period of time.</p> <p>3e. Complete Hot Work Permit, Designate Fire Watch.</p> <p>3e. Conduct work zone inspection:</p> <ul style="list-style-type: none"> <li>- Verify that all combustible or flammable materials or equipment fuel sources have been removed from within 35 feet of the proposed hot work.</li> <li>- If combustible or flammable materials or equipment fuel sources have not been removed from within 35 feet of the hot work, verify that engineering and procedural controls have been emplaced: curtains, blankets, wetting, ventilation.</li> </ul> <p>3e. Two 20-lb. Type ABC Fire extinguishers required.</p> <p>3e. Conduct continuous air monitoring / Lower Explosive Limit (LEL) screenings. Action Level: 10% of the LEL.</p> <p>3e. If ambient air concentrations exceed LEL Action Levels, STOP WORK and contact supervisor.</p> <p>3e. Wear hard hat, long sleeved-shirt and safety glasses. Utilize job specific PPE such as welding jacket or chaps and welding glasses when using gas powered saw or a plasma cutter.</p>
4. Secure area when leaving tools unattended.	<p><b>4a. CONTACT:</b> Unauthorized personnel may enter the work area</p> <p><b>4b. FALL:</b> Slip/trip/fall</p>	<p>4a. Unplug saw when not being used. Store equipment in designated storage areas when not being used.</p> <p>4b. Store tool in designated storage location when it is not being used, secure all extension cords, keep all equipment out of walkways.</p> <p>4b. Keep work area free of Slip, Trip and Fall Hazards.</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 six 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".

<b>JOB SAFETY ANALYSIS</b> Ctrl. No. GEN-006		DATE 7/10/2020	<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>	
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Timothy Zei		Project Hydrogeologist	Raymond Olson	Office Health & Safety Manager
			Brian Hobbs	Corporate Health & Safety Manager
<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. Type ABC Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs, Water				
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs				
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HE EZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.				
<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 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.  1c. <b>CONTACT:</b> Crushing from roll-over.	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 which encompasses its tip radius</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. 1c Geoprobe should cross all hills/obstructions head on with the mast down to reduce risk of roll-over.		
2. Raising tower/derrick of drill rig	2a. <b>CONTACT:</b> Overhead hazards.  2b. <b>CONTACT:</b> Pinch Points/Amputation 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 of 10' from overhead structures.  2b. Inspect the equipment prior to use and avoid pinch/amputation points. 2b. Lower outriggers 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  3b. <b>EXPOSURE:</b> Noise and dust.	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection.  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.		

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<sup>2</sup> A hazard is a potential danger. Break hazards into six 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
3. Advancement of drilling equipment and well installation (Continued)	<p><b>3a. CONTACT:</b> Flying debris</p> <p><b>3b. EXPOSURE:</b> Noise and dust.</p> <p><b>3c. FALL:</b> Slip/trip/fall hazards.</p> <p><b>3d. CAUGHT:</b> Limb/extremity pinching; abrasion/crushing.</p> <p><b>3e. CONTACT:</b> Equipment imbalance during advancement of drill equipment.</p> <p><b>3f. EXPOSURE:</b> Inhalation of contamination/vapors.</p> <p><b>3g. EXERTION:</b> Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.</p>	<p>3c. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area.</p> <p>3c. See 1b.</p> <p>3d. Ensure all Emergency Safety Stop buttons function properly.</p> <p>3d. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools.</p> <p>3d. Inspect the equipment prior to use for potential pinch/amputation points. Keep hands away from pinch/amputation points and use of tools is preferable compared to fingers and hands.</p> <p>3d. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt.</p> <p>3d. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>3d. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment.</p> <p>3d. Drillers and helpers will understand and use the "Show Me Your Hands" Policy.</p> <p>3d. Spinning rods/casing have an <b>exclusion zone of tip radius</b> while in operation.</p> <p>3e. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip.</p> <p>3e. 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.</p> <p>3e. 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</b>).</p> <p>3f. Monitor ambient air for dangerous conditions using a calibrated photoionization detector (PID) to periodically monitor the breathing zone of the work area.</p> <p>3f. 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. Use a multi-gas meter to monitor ambient air for dangerous conditions (i.e. unsafe levels of carbon monoxide when drilling indoors or the presence of explosive vapors).</p> <p>3g. Keep back straight and bend at the knees.</p> <p>3g. Utilize team lifting for objects over 50lbs.</p> <p>3g. Use mechanical lifting device for odd shaped objects.</p>
4. Remove sample liner.	<p><b>4a. EXERTION:</b> Potential for muscle strain/injury while removing liner from probe rod.</p> <p><b>4b. CONTACT:</b> Pinch points and cuts</p> <p><b>4c. EXPOSURE:</b> Inhalation and/or dermal contact with contaminants.</p>	<p>4a. Utilize team lifting for objects over 50lbs.</p> <p>4a. Use hydraulic liner extruder if available.</p> <p>4b. Place liner on sturdy surface when opening.</p> <p>4b. Don cut-resistant gloves and use appropriate liner cutter when opening liners.</p> <p>4b. Always cut away from the body.</p> <p>4c. Wear chemical-resistant disposable gloves when handling liners.</p> <p>4c. See 3e.</p>
5. Decontaminate equipment.	<p><b>5a. EXPOSURE/CONTACT:</b> To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p><b>5b. EXPOSURE:</b> To chemicals in cleaning solution including ammonia.</p>	<p>5a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>5a. Contain decontamination water so that it does not spill.</p> <p>5a. Use an absorbent pad to clean spills, if necessary.</p> <p>5a. Spray equipment from side angle, not straight on, to avoid backslash.</p> <p>5a. See 3b.</p> <p>5b. See 4a. Review SDS to ensure appropriate precautions are taken and understood.</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</b>		<b>Ctrl. No. GEN-007</b>	DATE 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>GENERIC</b>		WORK TYPE <b>General Site Activity</b>	WORK ACTIVITY (Description) <b>Driving</b>		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Valerie Sabatasso		Staff Scientist	Brian Hobbs	Corporate Health & Safety Manager	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<input type="checkbox"/> LIFE VEST	<input type="checkbox"/> GOGGLES	<input type="checkbox"/> AIR PURIFYING RESPIRATOR	<input checked="" type="checkbox"/> GLOVES: <u>Leather/ cut-resistant level 2</u>		
<input checked="" type="checkbox"/> HARD HAT: <u>when outside vehicle</u>	<input type="checkbox"/> FACE SHIELD	<input type="checkbox"/> SUPPLIED RESPIRATOR	<input type="checkbox"/> OTHER _____		
<input type="checkbox"/> LIFELINE / BODY HARNESS	<input checked="" type="checkbox"/> HEARING PROTECTION	<input checked="" type="checkbox"/> PPE CLOTHING: <u>high visibility vest, when outside vehicle</u>			
<input checked="" type="checkbox"/> SAFETY GLASSES: <u>when outside vehicle</u>	<input checked="" type="checkbox"/> SAFETY TOE BOOTS: <u>when outside vehicle</u>				
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Motor Vehicle (i.e. car, truck, SUV)					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.					
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>			
1. Driving to/leaving Site	<p><b>1a. CONTACT:</b> Severe injury/disability, property damage, monetary loss (insurance premiums, deductibles, loss of license/job) caused by collision with or struck by other vehicles, obstructions, pedestrians, animals, etc.</p> <p>*Common factors that may lead to CONTACT incident, but not limited to:</p> <ul style="list-style-type: none"> <li>• distracted driving (cell phone, GPS, radio, billboards, "rubber necking")</li> <li>• lack of situational awareness</li> <li>• unfamiliarity with traffic patterns/road layout</li> <li>• weather conditions (wet/icy roads, hydroplaning, black ice)</li> <li>• weariness</li> <li>• high speeds</li> <li>• obstructed vision (solar glare, debris on windshield, blind spots)</li> <li>• changes in travel pathway (construction, snow banks, non-operational signals, potholes, detours, special events)</li> <li>• improper vehicle maintenance (non-operational signal light, worn tires, cracked windshield, ineffective wipers)</li> <li>• loose or unsecure objects</li> </ul>	<p>1a. PLAN AHEAD – review/make yourself familiar with maps and driving directions before beginning the drive to the Site. Do not attempt to drive and review maps/directions at the same time. Pull over and stop your vehicle before looking at maps/directions.</p> <p>1a. Complete a basic vehicle inspection before driving. Verify Inspection and Registration are current, tires and wipers are in good condition, all lights are functional, all glass/mirrors are undamaged, the horn is functional, roof/hood/trunk are free from accumulated snow and visibility is not impaired due to snow/ice/frost/fog on windows.</p> <p>1a. Do not hang items in car that can obstruct your view or become projectiles in a collision.</p> <p>1a. Do not get distracted using touch screen radios or GPS units built into newer models. Keep your eyes on the road and stay alert.</p> <p>1a. Follow posted speed limits and obey traffic signals and roadway signs.</p> <p>1a. Always wear your seat belt and shoulder harness when driving.</p> <p>1a. When driving around large vehicles and trucks, maintain extra space as these vehicles may not be able to see a smaller car too close.</p> <p>1a. Follow the "Rules of the Road" including: using your turn signals, coming to a complete stop, and allowing vehicles the right of way (yield) when they are when traffic laws require.</p> <p>1a. Apply the Smith Five Keys® of safe driving</p> <ul style="list-style-type: none"> <li>• Aim High in Steering® <ul style="list-style-type: none"> <li>- Expand eye lead time to a minimum of 15 seconds</li> </ul> </li> <li>• Get the Big Picture® <ul style="list-style-type: none"> <li>- Maintain proper a 4 second minimum following distance at all times</li> <li>- Scan mirrors every 5-8 seconds to achieve a circle of awareness</li> <li>- Position your vehicle so you can see relevant/non-relevant objects</li> </ul> </li> <li>• Keep Your Eyes Moving® <ul style="list-style-type: none"> <li>- Try to maintain about 180 degrees of visibility</li> <li>- Avoid blank and fixed stares. Avoid focusing on one object for more than 2 seconds</li> </ul> </li> <li>• Leave Yourself an Out® <ul style="list-style-type: none"> <li>- Avoid traveling in traffic clusters</li> <li>- Surround yourself with space</li> <li>- Anticipate the actions of others</li> </ul> </li> </ul>			

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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".

Assess 1 JOB STEPS	Analyze 2 POTENTIAL HAZARDS	Act 3 CRITICAL ACTIONS
1. Driving to/leaving Site (cont'd)	<p><b>1a. CONTACT:</b> Severe injury/disability, property damage, monetary loss (insurance premiums, deductibles, loss of license/job) caused by collision with or struck by other vehicles, obstructions, pedestrians, animals, etc.</p>	<ul style="list-style-type: none"> <li>• Make Sure They See You® <ul style="list-style-type: none"> <li>- Maintain eye contact with on-coming vehicles/pedestrians</li> <li>- Use warning devices (e.g., hand signals, high-lights, horns etc.)</li> <li>- Proper timing is essential</li> </ul> </li> </ul> <p>1a. Do not perform reconnaissance or inspections while driving. Your vehicle should be parked in a safe location when viewing or surveying the Site and vicinity</p> <p>1a. Avoid sudden turns and stops. Don't drive recklessly – be in control of vehicle at all times.</p> <p>1a. In inclement weather, first determine if work can be POSTPONED. Otherwise, plan according to weather conditions including checking forecast along entirety of travel route (especially, for long distances). Reduce speed as road conditions warrant. Travelling with winter car equipment, in the winter, is strongly recommended (i.e., shovel, scraper, brush, blanket, extra clothing, flashlight, bag of sand). If your vehicle has 4-wheel drive, review to operators manual and understand operating procedure prior to engaging 4-wheel drive. If at any point on your drive weather becomes too severe to proceed safely pull over if safe to do so or seek nearest cover (e.g., overpass)</p> <p>1a. If feeling drowsy or sleepy, do not drive. Pull over in a safe place to rest if you experience any signs of drowsiness. Make sure to get adequate sleep the night before an early drive.</p> <p>1a. Never operate a vehicle under the influence of alcohol or illegal substances or medications affecting your performance.</p> <p>1a. Keep your eyes on the road. Do not call or talk on cellular phones. Pull over to a safe location if you must answer or make a call.</p> <p>1a. When parking, pull-through when possible. If backing is required visually inspect area to ensure it is free from obstructions prior to backing in and relying solely on mirrors; use spotters when available.</p>
2. Entering/Exiting Vehicle.	<p><b>2a. CAUGHT:</b> Personal injury (broken fingers/hand) while entering or exiting vehicles</p> <p><b>2b. FALL:</b> Personal injury (twisted ankle, deep contusion, concussion, broken wrist/arm, etc.) from slip/fall on uneven or unstable or slippery surface while exiting/entering vehicle</p> <p><b>2c. CONTACT:</b> Severe injury/disability, property damage, monetary loss (insurance premiums, deductibles, loss of license/job) caused by collision with or struck by other vehicles, obstructions, pedestrians, animals, etc.</p>	<p>2a. Open and close doors slowly. Never put hands or feet in between door and vehicle to avoid pinch points.</p> <p>2b. When exiting the vehicle make sure your feet are on firm footing and weight is evenly distributed before exiting/standing. In inclement weather use hands to support yourself, by holding the car door and/or steering wheel, when exiting the vehicle.</p> <p>2c. Check both directions for traffic before opening door. Do not exit vehicle if traffic does not permit you to exit safely</p> <p>2c. Check anticipated path of door prior to opening, do not open door into any obstructions (e.g., bollards, high curbing)</p>

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<b>JOB SAFETY ANALYSIS</b>		<b>Ctrl. No. GEN-009</b>	DATE: 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 1
JSA TYPE CATEGORY <b>Generic</b>		WORK TYPE <b>O&amp;M</b>	WORK ACTIVITY (Description) <b>Movement of 55-Gallon Drums/Drum Handling with Mobile Carrier</b>		
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Michael Sarni		Technician	Brian Hobbs	Corporate Health & Safety Manager	
<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 type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or composite toe</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent long sleeve shirt or long sleeve shirt and reflective safety vest.</u>	<input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant gloves</u> <input type="checkbox"/> OTHER:	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Mobile Drum Carrier, safety cones, and caution tape					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment (i.e. forklift) and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.					
<b>Assess JOB STEPS</b>		<b>Analyze POTENTIAL HAZARDS</b>		<b>Act CRITICAL ACTIONS</b>	
1. Preparing for and Inspection of Drum		<b>1a. FALL:</b> Tripping/falling due to uneven surface. Loose debris/garbage in work area.  <b>1b. CONTACT/EXPOSURE:</b> Drums could potentially be damaged or contain hazardous material. Mobile drum carrier could potentially be in poor working condition causing malfunctioning during operation.  <b>1c. EXERTION/CAUGHT:</b> Potential pinching/exertion hazards while securing ring/tightening bolts		1a. Clear area of loose garbage and debris. Inspect 55-gal drums for proper condition, labeling, check drum ring and bolts for tightness, inspect mobile drum carrier. 1a. Do a Test Lift to get a general sense of the weight of the drum. 1a. Inspect and use established pathways to avoid uneven terrain, weather-related hazards (i.e., debris, puddles, ice, etc.), and other obstructions.  1a. Secure work area and coordinate and communicate the planned work activities with other personnel working in the area. 1a. Delineate work area with 42" safety cones. 1b. Prior to inspecting drums don cut-resistant gloves. If drum is not properly labeled, do not open and cease all drum transport activities. Immediately contact project manager and inform him/her of drum situation. 1b. Do not continue drum transport activities until further actions are determined by the project manager. 1b. If the drum is properly labeled, but leaking, improperly sealed or in poor condition, place drum in an over-pack drum. 1b. Inspect mobile drum carrier to ensure its overall integrity. Look for rust marks or potential weak points where the drum carrier could malfunction. Inspect the wheels to ensure that they easily turn and nothing is impeding their movement. 1c. Keep back straight and knees slightly bent while securing drum ring/tightening bolt. Wear cut-resistant gloves.	

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<p>2. Position drum clamp tightly in between drum ribs, securing drum clamp to drum with chain</p>	<p>2a. <b>CAUGHT:</b> Pinching fingers between drum clamp and handle/chain.</p>	<p>2a. Attach drum clamp with chain and tighten until snug. Do not place hands between drum clamp and drum as the chain is tightened; wear cut resistant gloves. Keep face away from drum when handling in case of escaping vapors.</p>
<p>Assess <b><sup>1</sup>JOB STEPS</b></p>	<p>Analyze <b><sup>2</sup>POTENTIAL HAZARDS</b></p>	<p>Act <b><sup>3</sup>CRITICAL ACTIONS</b></p>
<p>3. Disengage safety latches on handle, pull handle down until drum is lifted off ground and safety latches are reengaged; slightly suspending drum off the ground</p>	<p>3a. <b>EXERTION/ CONTACT:</b> Potential muscle strain associated with lifting/engaging drum/handle. Drum could shift/slip downward and crush toes.</p> <p>3b. <b>CAUGHT:</b> Fingers could be pinched while engaging/disengaging safety latches on handle</p>	<p>3a. Ascertain whether the drum is overweight; if it is, then two people are needed to lower handle while drum is secured with clamp so that safety latches can be engaged. Keep body out of the line of fire of the handle (do not position head above handle) as it is being pushed down. Do not allow feet/toes to be positioned under the drum as it is being lifted; wear steel/composite toe boots.</p> <p>3b. Wear cut-resistant gloves while disengaging/reengaging safety latches.</p> <p>3b. Avoid placing hands in pinch points.</p>
<p>4. Transport drums to designated location and disengage drum clamp (repeat Step 3 in reverse order)</p>	<p>4a. <b>FALL:</b> Tripping/ falling due to obstructions and uneven terrain. Potential for drum to fall during transport.</p>	<p>4a. Ensure transport path is free of potential obstructions that may cause the drum/carrier to become unstable. Position drum clamp between the ribs on the drum to prevent possible slipping.</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</b> Ctrl. No. GEN-013		DATE 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>	WORK TYPE: <b>Gauging and Sampling</b>	WORK ACTIVITY (Description): <b>Gauging and Sampling</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Brandon Tufano	Staff Geologist	Brian Hobbs	Corporate Health & Safety Manager	
<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., Type ABC Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Screw Driver, Crow Bar, Mallet, and Wire Brush.				
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs				
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>		
1. Mobilization to monitoring well(s).	<p><b>1a. FALL:</b> Personal injury from slip/trip/fall due to uneven terrain and/or obstructions.</p> <p><b>1b. CONTACT:</b> With traffic/third parties.</p> <p><b>1c. EXERTION:</b> Muscle strain from lifting equipment</p> <p><b>1d. EXPOSURE:</b> To biological hazards.</p>	<p>1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization.</p> <p>1a. Use established pathways, walk and/or drive on stable, secure ground and avoid steep hills or uneven terrain.</p> <p>1a. If working near open water with an unguarded edge, wear life vest.</p> <p>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.</p> <p>1b. Wear appropriate PPE including high visibility clothing or reflective vest.</p> <p>1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.</p> <p>1c. 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 50 lbs. or heavier.</p> <p>4c. Make multiple trips to carry equipment.</p> <p>1d. Inspect work area for bees and insects.</p> <p>1d. Use insect/tick repellent as necessary.</p>		
2. Open/close well.	<p><b>2a. EXERTION:</b> Muscle strain.</p> <p><b>2b. CAUGHT:</b> Pinch/crush points associated with removing/replacing manholes and working with hand tools.</p> <p><b>2c. CAUGHT:</b> Pinch points associated with placing J-plug back onto PVC pipe.</p> <p><b>2d. EXPOSURE:</b> To potential hazardous vapors.</p>	<p>2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well.</p> <p>2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools.</p> <p>2b. Use proper tools (ratchet and pry bar for well cover) and inspect before use.</p> <p>2b. Do not put fingers under well cover.</p> <p>2c. See 2b.</p> <p>2c. Keep fingers out of line-of-fire when securing cap.</p> <p>2d. No open flames/heat sources.</p> <p>2d. To minimize exposure to vapors, allow well to vent after opening it and before sampling activities begin.</p> <p>2d. Stand up-wind, if possible, to avoid inhaling vapors.</p>		
3. Gauge well.	<p><b>3a. CONTACT:</b> With contamination (e.g. contaminated groundwater).</p> <p><b>3b. CONTACT:</b> With traffic.</p>	<p>3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well.</p> <p>3a. Insert and remove probe slowly to avoid splashing.</p> <p>3a. Use an absorbent pad to clean probe.</p> <p>3b. See 1b.</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".

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
4. Purge and sample well	<p><b>4a. EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives.</p> <p><b>4b. CONTACT:</b> Personal injury from cuts, abrasions, or punctures by glassware or sharp objects.</p> <p><b>4c. EXERTION:</b> Muscle strain while carrying equipment.</p> <p><b>4d. CONTACT:</b> With traffic.</p> <p><b>4e. CONTACT:</b> Pinch points with groundwater pump components (i.e., wheel, line, clamps).</p> <p><b>4f. EXERTION:</b> Muscle strain from repetitive motion of bailing and sampling a well.</p>	<p>4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives.</p> <p>4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling.</p> <p>4a. Fill sample containers over purge container to avoid spilling water onto the ground.</p> <p>4a. Use an absorbent pad to clean spills.</p> <p>4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards.</p> <p>4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater.</p> <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> <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 50 lbs. 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 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><b>5a. EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p><b>5b. EXERTION:</b> Muscle strain from lifting/carrying and moving containers.</p>	<p>5a. Do not overfill container and pour liquids slowly so 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><b>6a. EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p><b>6b. 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>2</sup> A hazard is a potential danger. Break hazards into six 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".

<b>JOB SAFETY ANALYSIS</b>		Ctrl. No. <b>GEN-014</b>	DATE: 7/10/2020	<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>Hollow Stem Auger Soil Borings / Well Installation</b>		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Douglas Ferraiolo		Staff Geologist	Brian Hobbs	Corporate Health & Safety Manager	
<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 checked="" type="checkbox"/> GOGGLES: <u>Spoggles required if winds exceed 15 mph.</u> <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION: <u>(as needed).</u> <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or Composite Toe.</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent long-sleeve shirt or long-sleeve shirt and reflective safety vest.</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Cut-Resistant, and Nitrile.</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellent, Sunscreen (as needed).</u>		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Truck-Mounted Drilling Rig or Track Rig, Saw, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Interface Probe, 20 lb. Type ABC Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs.					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.					
<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 and establish a work area.	1a. <b>See Mobilization/ Demobilization JSA GEN-015.</b>	1a. See Mobilization / Demobilization JSA GEN-015.			
2. Raising tower / derrick of drilling rig.	2a. <b>CONTACT:</b> Overhead hazards.  2b. <b>CONTACT:</b> Amputation / crush 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 overhead hazards (wires, tree limbs, piping or other structures) that may be contacted by the rig's tower or drilling rods. 2a. The tower / derrick must not be raised beneath overhead power lines unless approved by the Roux PM. 2a. Maintain a minimum of 10' from all overhead structures. 2a. Do not move the rig while the tower / derrick is raised. 2b. Inspect the equipment prior to use and avoid any potential amputation points. 2b. Lower outriggers to ensure stability prior to raising rig tower derrick. Keep feet and body out of the line of fire when lowering out-riggers. 2b. Inspect the set-up location for uneven terrain. Level or avoid area if needed. 2b. If the rig needs to be mounted, be sure to use three points of contact.			
3. Advancement of augers for soil boring installation.	3a. <b>CONTACT:</b> Equipment imbalance during advancement of drill equipment.  3b. <b>CONTACT:</b> Flying / spraying debris.  3c. <b>CAUGHT:</b> Limb/extremity amputation, abrasion, and crushing.	3a. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and / or tip. 3a. 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. <b>3a. Drillers will maintain the "Purple Zone" policy surrounding augers to ensure no personnel come into contact with augers while in use. Workers will spray paint a 3' semi-circle surrounding the augers to visually show that no personnel should enter the "Purple Zone" while drilling activities are being conducted.</b> 3a. 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 (minimum exclusion zone of 20 feet). 3b. Wear all required PPE (especially hand, eye, and ear protection). 3b. Maintain minimum EZ distance (i.e. swing/tip radius of rig) when rig is in operation to avoid potential line of fire hazards from flying materials or debris. 3c. Inspect the equipment prior to use for potential pinch points. 3c. Test all emergency shutdown devices prior to drilling. 3c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3c. Inspect augers, do not use if auger flight is damaged or bent.			

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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.

<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. Advancement of augers for soil boring installation (Continued).	<p><b>3d. FALL:</b> Slip/trip/fall hazards.</p> <p><b>3e. EXPOSURE:</b> Inhalation of contamination / vapors.</p> <p><b>3f. EXPOSURE:</b> Noise and dust.</p> <p><b>3g. EXERTION:</b> Installing well casings and lifting augers.</p>	<p>3c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>3c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment particularly when installing auger flights and steel override casings.</p> <p>3c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy.</p> <p>3c. Spinning augers should have an exclusion zone of 20 feet when in operation.</p> <p>3d. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.</p> <p>3d. Do not climb over stored materials/equipment; walk around. Practice good housekeeping.</p> <p>3d. Use established pathways and walk on stable, secure ground.</p> <p>3d. Use three points of contact when mounting or dismounting the rig.</p> <p>3d. Remove soil cuttings to avoid a tripping hazard from developing near augers.</p> <p>3e. Air monitoring using a calibrated photoionization detector (PID) to periodically monitor the breathing zone of the work area.</p> <p>3e. The Action Level for breathing zone air is five parts per million (sustained) as detected by the PID.</p> <p>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 appropriate precautions in accordance with the site specific health and safety plan.</p> <p>3f. Wet borehole area with sprayer to minimize dust. Stand upwind and keep body positioned away from rig.</p> <p>3f. Wear hearing protection while drill rig is operating and / or the noise levels exceed 85 dBA.</p> <p>3g. Keep back straight and bend at the knees.</p> <p>3g. Utilize team lifting for objects over 50lbs.</p> <p>3g. Use mechanical lifting device for odd shaped objects.</p>
4. Installation of well materials.	<p><b>4a. CONTACT:</b> Installing well materials while also pulling up augers.</p> <p><b>4b. CAUGHT:</b> Possible pinch or crush hazard assembling PVC and sending down the borehole.</p> <p><b>4c. FALL:</b> Slip/trip/fall hazards with hand tools and materials.</p> <p><b>4d. EXPOSURE:</b> Potential contamination, harmful vapors, dust, and / or noise.</p> <p><b>4e. EXERTION:</b> Lifting heavy bags of materials to backfill borehole.</p>	<p>4a. Potential contact with augers during installation of well materials.</p> <p>4a. Keep distance from augers and do not place any materials while augers are in motion.</p> <p>4b. Keep all body parts out of potential pinch points while placing PVC together and sending down borehole.</p> <p>4c. See 3d.</p> <p>4d. See 3e and 3f.</p> <p>4d. Stand upwind to avoid exposure to dust generated from packing materials.</p> <p>4e. Ergonomic hazard lifting bags of sand and bentonite while packing the well.</p>
5. Cleaning the auger flights	<p><b>5a. CONTACT:</b> Cuts/scrapes or puncture wound from contacting auger.</p>	<p>5a. Follow "Show Me Your Hands" Procedure and make sure auger is out of gear before contacting auger with tool or hand.</p> <p>5a. Pull cleaning tool across your body with handle away from body; do not push toward the auger.</p> <p>5a. Do not clean more than ¼ turn around the auger at a time.</p> <p>5a. Wear cut resistant and leather gloves.</p> <p>5a. Always use two hands to operate cleaning tool.</p> <p>5a. Inspect tool before use and remove from service if handle or metal are cracked/fatigued.</p> <p>5a. Stand out of the line of fire.</p>
6. Decontaminate equipment.	<p><b>6a. EXPOSURE / CONTACT:</b> To contamination (e.g., contaminated groundwater, vapors).</p> <p><b>6b. EXPOSURE:</b> To chemicals in cleaning solution (including ammonia).</p>	<p>6a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>6a. Contain decontamination water so that it does not spill.</p> <p>6a. Use an absorbent pad to clean spills, if necessary.</p> <p>6b. See 3e. Wear all appropriate PPE and stand upwind of any exposed cleaning solutions.</p>

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<b>JOB SAFETY ANALYSIS</b>		Ctrl. No. <b>GEN-015</b>	DATE: 7/10/2020	<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>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	
Rebecca Lowy		Staff Assistant Geologist		Brian Hobbs	
Tally Sodre		OHSM			
<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>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 checked="" type="checkbox"/> GLOVES: <u>Leather, nitrile, and cut resistant (as needed)</u> <input type="checkbox"/> OTHER			
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Required Equipment: Varies					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.					
<b>Assess JOB STEPS</b>	<b>Analyze POTENTIAL HAZARDS</b>	<b>Act CRITICAL ACTIONS</b>			
1. Mobilize/demobilize and establish work area	<p><b>1a. FALL:</b> Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.</p> <p><b>1b. CONTACT:</b> Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.</p>	<p>1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle.</p> <p>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.</p> <p>1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping; organize and store equipment neatly in one area at its lowest potential energy.</p> <p>1a. Wear boots with adequate treads.</p> <p>1a. Delineate unsafe areas with 42" cones, caution tape and/or flagging.</p> <p>1b. Observe and maintain the posted speed limits.</p> <p>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.</p> <p>1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities and to discuss any special hazards. Ensure that short-service employees (SSE) are identified.</p> <p>1b. Identify potential traffic sources.</p> <p>1b. Wear PPE including high visibility clothing or reflective vest.</p> <p>1b. Use a spotter while moving work vehicles; plan ahead to avoid backing whenever possible.</p> <p>1b. Maintain a minimum exclusion zone when vehicles are in motion (i.e. greater than swing/tip radius of equipment). 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-to-spotter visibility.</p> <p>1b. Delineate work area with 42" cones, flags, caution tape, and/or other barriers.</p> <p>1b. Position "Work Area" signs at Site entrances, if possible, or at either side of work area.</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."

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
	<p><b>1c. CAUGHT:</b> Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.</p> <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> Weather related injuries.</p> <p><b>1g. EXPOSURE:</b> Personal injury from noise hazards.</p>	<p>1b. Position largest vehicle to protect against oncoming traffic.</p> <p>1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route.</p> <p>1b. Observe potential overhead and ground surface features that may interfere with moving equipment. Clear the path of physical hazards prior to initiating mobilization.</p> <p>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 (positioned to best block oncoming traffic) of work area.</p> <p>1c. Wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools/glass.</p> <p>1c. Keep body parts away from line-of-fire of equipment.</p> <p>1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure.</p> <p>1c. Remove any loose jewelry. Avoid wearing loose clothing and/or ensure loose clothing is secure.</p> <p>1c. Secure all items on the equipment, tighten up any items or features that have potential to shift or break during mobilization.</p> <p>1d. Use body positioning and lifting techniques that avoid muscle strain; keep back straight, lift with legs, turn with whole body, 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 to exposed skin, 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, nausea, rapid and shallow breathing). Take breaks in cool places and hydrate 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 in warm areas 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 dBA (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> Ctrl. No. GEN-017		DATE: 7/10/2020	<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>Monitoring and Recovery Well Development</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Ron Lombino	Project Geologist	Brian Hobbs	Corporate Health & Safety Manager	
Courtney Lind	Project Engineer			
<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 or cut-resistant and Nitrile</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. Type ABC Fire Extinguisher, Holding Tanks and/or Buckets, Absorbent Pads, 5-gas meter, Tools as needed: Socket and Pipe Wrench, Screw Driver, Pry Bar, Ratchet, Vault Key.				
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs				
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HE EZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.				
<b>“SHOW ME YOUR HANDS”</b>				
<b>Driller and helper should show that hands are clear from controls and moving parts</b>				
<b>Assess JOB STEPS</b>	<b>Analyze POTENTIAL HAZARDS</b>	<b>Act CRITICAL 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 greater than the swing/tip radius of equipment.</b> 1a. Beep horn twice before backing up. 1a. When backing up with an attached trailer use a spotter 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>EXERTION:</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 cut-resistant/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>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><b>3a. CAUGHT:</b> Cut hazards and finger pinch points.</p> <p><b>3b. CONTACT/EXPOSURE:</b> Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p><b>3c. EXERTION:</b> Muscle strain from lifting equipment.</p> <p><b>3d. 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 greater than the swing/tip radius of equipment.</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><b>4a. CAUGHT:</b> Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses.</p> <p><b>4b. FALL:</b> Using side mounted ladder when attaching hose to tank.  Slip, trip, fall from lines/hoses</p> <p><b>4c. CONTACT:</b> Contamination (e.g., SPH, contaminated groundwater).</p> <p><b>4d. EXERTION:</b> Muscle strain from lifting/carrying equipment.</p> <p><b>4e. 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 to make sure steps are not bent/damaged and free of debris/fluid.</p> <p>4b. Use three points of contact always when using ladder.</p> <p>4b. Use hoist or other mechanical means to secure and move hose.</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. See 2a.</p> <p>4e. Clean up any spills using absorbent pads or spill kits.</p>
5. Decontaminate equipment	<p><b>5a. CONTACT/EXPOSURE:</b> Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p><b>5b. 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>JOB SAFETY ANALYSIS</b>		<b>Ctrl. No. GEN-019</b>	DATE: 7/10/2020	<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>Site Recon</b>		<b>WORK ACTIVITY (Description)</b> <b>Site Walk and Inspection</b>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	
Sara Barrientos		Staff Geologist		Brian Hobbs	
				Joe Duminuco	
				Corporate Health and Safety Manager	
				Vice President	
<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: ear plugs as necessary <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or composite toed</u>		<input type="checkbox"/> AIR PURIFYING RESPIRATOR SUPPLIED <input type="checkbox"/> RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>High-visibility vest or high-vis outerwear</u>	
				<input checked="" type="checkbox"/> GLOVES: <u>Leather/cut-resistant/chemical resistant</u> <input checked="" type="checkbox"/> OTHER: Tyvek and rubber boots as necessary, dust mask as necessary	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Required Equipment: Site map, emergency contact list, documentation of urgent care/hospital routes and / or guide familiar with Site, operating cell phone or walkie-talkie if Site allows.					
<b>Commitment to Safety</b> – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.					
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.					
<b>SITE SECURITY:</b> Prior to site inspection verify appropriate method to address Site Security concerns as it relates to potential criminal activity, homeless population, and/or isolation concerns. Work with the Project Principal and/or Project Manager to address appropriately.					
<b>Assess JOB STEPS</b>		<b>Analyze POTENTIAL HAZARDS</b>		<b>Act CRITICAL ACTIONS</b>	
1. Check in with Site contact.		1a. <b>CONTACT/EXPOSURE/FALL:</b> Personal injury caused by lack of site specific hazards.		1a. Inquire about hazards and other activities taking place at the Site. 1a. Inform Site contact of work scope, timeline and location(s). 1a. Discuss emergency evacuation procedures and muster points with Site contact.	
2. Traversing the Site		2a. <b>CONTACT:</b> Property damage and personal injury caused by obstructions/vehicles or unauthorized personnel at remote Sites.		2a. All equipment must be stowed and secured prior to moving. 2a. Maintain speed limit as posted on-site. 2a. When possible drive on established roadways. 2a. Yield to all pedestrians. 2a. Use pull-through spots or back into parking spots. 2a. Don high visibility clothing/safety vest. If working at remote Site, add orange accessories during hunting season.	
		2b. <b>FALL:</b> Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone.		2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2b. When possible, use established pathways and walk on stable, secure ground. 2b. Communicate traversing hazards with others.	
		2c. <b>OVEREXERTION:</b> Muscle strain while carrying equipment.		2c. When carrying equipment to/from work area, use proper lifting techniques; keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use mechanical assistance or make multiple trips to carry equipment.	
		2d. <b>EXPOSURE:</b> Biological hazards – ticks; bees/wasps; poison ivy; insects; (Ticks are most active any time the temperature is above freezing, typically from March to November.)		2d. Inspect area to avoid contact with biological hazards. 2d. Ticks: <ul style="list-style-type: none"> <li>• Treat outer clothing including pants, shirts, socks, boots and hats the evening before with Permethrin (allowing at least two hours before use).</li> <li>• Apply DEET to exposed skin before travelling to the Site and reapply after two hours.</li> <li>• Check for ticks during and after work.</li> </ul> 2d. Bees: <ul style="list-style-type: none"> <li>• Use bee spray as appropriate to deter/eliminate bees.</li> </ul>	

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	<p><b>2e. EXPOSURE:</b> Heat Stress &amp; Cold Stress. Personal injury from working in inclement weather conditions.</p>	<ul style="list-style-type: none"> <li>Protect exposed skin with insect repellent.</li> </ul> <p>2d. Poison Ivy:</p> <ul style="list-style-type: none"> <li>Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas.</li> <li>If skin contacts poison ivy, wash skin thoroughly with soap and water.</li> </ul> <p>2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected.</p> <p>2e. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.</p> <p>2e. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.</p> <p>2e. Wear appropriate rain gear as needed.</p> <p>2e. Take frequent breaks if tired, wet, or cold/hot. Drink water.</p> <p>2e. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.</p>
<p>3. Walking near heavy equipment and machinery.</p>	<p><b>3a. CONTACT:</b> Personal injury from Site and roadway traffic. Personal injury from flying debris</p> <p><b>3b. OVEREXERTION:</b> Personal injury from lifting/moving/rotating equipment.</p> <p><b>3c. EXPOSURE:</b> Hearing damage from noise generating equipment/processes. Inhalation/exposure to hazardous vapors and or dust.</p> <p><b>3d. EXPOSURE:</b> Working in a remote area.</p>	<p>3a. See 2a.</p> <p>3a. Maintain an exclusion zone of at least 10'-25' feet from all engaged equipment.</p> <p>3a. Keep body parts out of the line of fire of pinch points.</p> <p>3a. Wear appropriate PPE always.</p> <p>3b. See 2c.</p> <p>3c. Wear hearing protection if &gt;85 dBA. (i.e. noise levels which require you to raise your voice to communicate)</p> <p>3c. Always wear leather gloves when handling any tools or equipment.</p> <p>3c. Always wear appropriate PPE based off chemicals present.</p> <p>3d. Use the "buddy system" whenever possible. If working alone, contact PM upon arrival/departure, as well as during work activities prior to commencing work if applicable.</p> <p>3d. Always carry a communication (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) device when traversing remote areas.</p>
<p>4. Working in adverse weather conditions.</p>	<p><b>4a. EXPOSURE:</b> Heat Stress &amp; Cold Stress. Personal injury from working in inclement weather conditions.</p>	<p>4a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.</p> <p>4a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.</p> <p>4a. Wear appropriate rain gear as needed.</p> <p>4a. Take frequent breaks if tired, wet, or cold/hot. Drink water.</p> <p>4a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.</p>
<p>5. Departing Site.</p>	<p><b>5a. EXPOSURE:</b> Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search.</p>	<p>5a. Sign out or notify Site contact and Roux Project Manager of your departure.</p>

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<b>JOB SAFETY ANALYSIS</b> Ctrl. No. GEN-020		DATE: 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>GENERIC</b>	WORK TYPE: <b>Gauging &amp; Sampling</b>	WORK ACTIVITY (Description): <b>Soil Sampling</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
MaryBeth Lyons	Project Scientist	Brian Hobbs	Corporate Health and Safety Manager	
<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 checked="" type="checkbox"/> FLAME RESISTANT CLOTHING (as needed)	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD: <input checked="" type="checkbox"/> HEARING PROTECTION: (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: Composite-toe or steel toe boots	<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>				
Recommended Equipment: 42" traffic cones, caution tape, trowel				
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.				
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HEEZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.				
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>		
1. Secure location	<p><b>1a. CONTACT:</b> Personnel and vehicular traffic may enter the work area.</p> <p><b>1b. FALL:</b> Tripping/falling due to uneven terrain or entry/exit from excavations.</p> <p><b>1c. EXPOSURE:</b> Exposure to sun and excessive heat, possibly causing sunburn, heat exhaustion or heat stroke.  Exposure to cold temperatures possibly causing cold stress.  Skin burn as a result of fire, if applicable.  Exposure to explosive vapors due to tank farm operations.  Exposure to airborne dust due to high wind speeds.  Biological hazards - ticks, bees/wasps, poison ivy, thorns, insects, etc.</p>	<p>1a. If in an area with foot or vehicle traffic, delineate the work area with 42" traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity. 1a. Wear reflective vest and/or high visibility clothing. 1a. Face the direction of any vehicular traffic. Position vehicle to protect worker from traffic. 1a. Communicate work activity with adjacent work areas.</p> <p>1b. Inspect pathways and work area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions. 1b. Use established pathways and walk on stable, secure ground. 1b. Stage equipment and tools in a convenient, stable, and orderly manner. Store equipment at lowest potential energy. 1b. Roux employees should stay 5 feet from in-progress excavations and trenches. Should entry to an excavation be required (when stabilization is complete), ladders must be employed for steep embankments, excavations, pits, and trenches.</p> <p>1c. Wear sunscreen with an SPF 15 or greater whenever 30 minutes or more of exposure is expected. 1c. Use a tent to shade the work area from direct sunlight particularly when warm temperatures are expected. 1c. Be aware of the location of all Site personnel. 1c. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). 1c. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). 1c. Take breaks for rest and water as necessary. Move to an area that is well shaded or a climate controlled area (i.e., car, site trailer, etc.). 1c. No open flames/heat sources. 1c. Flame retardant clothing must be worn when specified by Site policy. 1c. Cell phones should be disabled when specified by Site policy. 1c. Pre-treat field clothing with Permethrin prior to site visit to kill ticks and insects. 1c. Wear long sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin. 1c. Spray insect repellent containing DEET on exposed skin when working in overgrown areas of the Site. 1c. Inspect area to avoid contact with biological hazards. 1c. Wear cut-resistant gloves when handling branches, shrubs, etc. that may lie within the walking path. 1c. Wear spoggles if the average wind speeds are above 15 mph. 1c. Personnel shall examine themselves and co-worker's outer clothing for ticks periodically when onsite. 1c. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water. If rash persists after washing, immediately notify your supervisor, the OM and OHSM for possible consultation with a physician at an approved Occupational Health Clinic.</p>		

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Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
2. Collect Soil Sample	<p><b>2a. CONTACT:</b> Personal injury from pinch points, cuts, and abrasions from sampling equipment tools, and material within soil sample. Personal injury from contact with moving equipment while sampling. Personal injury from contact with glass sample jars.</p> <p><b>2b. EXPOSURE:</b> Exposure to contamination (impacted soil) and/or lab preservatives.</p> <p><b>2c. EXERTION:</b> Exertion due to repetitive motion and ergonomics.</p>	<p>2a. Wear cut-resistant (i.e., Kevlar) gloves under chemical-resistant (nitrile) disposable gloves when handling soil samples and sampling jars. 2a. Where possible, use trowel or equivalent tool to avoid contact with soil. 2a. If sampling from bucket of heavy equipment, ensure all equipment is off and operator utilizes the "show me your hands" policy. 2a. See 1a.</p> <p>2b. Wear chemical-resistant (nitrile) disposable gloves over cut resistant gloves to protect hands when handling samples; use containment material or plastic sheeting to protect surrounding areas. 2b. Wear safety glasses to protect eyes from dust or air-borne contaminants that may result from disturbing the soil. 2b. Where possible, remain upgradient from sample location if collecting soil sample from stockpile, drill rig, etc. to avoid breathing contaminant vapors, if they are present. 2b. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground. 2b. Open sample jars slowly and fill carefully to avoid contact with preservatives.</p> <p>2c. Utilize a table or raised surface for soil sampling if multiple soil samples are going to be taken to minimize repetitive bending motion.</p>
3. Decontaminate equipment	<p><b>3a. EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated vapors and/or soil).</p> <p><b>3b. EXPOSURE:</b> Chemicals in cleaning solution including ammonia.</p>	<p>3a. Wear chemical-resistant (nitrile) disposable gloves and safety glasses. 3a. Use an absorbent pad to clean spills. 3a. Properly dispose of used materials/PPE in provided drums in designated drum storage area. 3a. Remain upwind of sample and avoid breathing contaminant vapors, if they are present.</p> <p>3b. Wear chemical-resistant (nitrile) disposable gloves and safety glasses. 3b. Work on the upwind side of decontamination area. 3b. Use an absorbent pad to clean spills. 3b. Properly dispose of used materials/PPE in provided drums in designated drum storage area. Ensure that all drums are properly labeled and secured.</p>

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<b>JOB SAFETY ANALYSIS</b> Ctrl. No. GEN-021		DATE: 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>GENERIC</b>	WORK TYPE <b>Gauging and Sampling</b>	WORK ACTIVITY (Description) <b>Soil Vapor Sampling (Permanent Monitoring Points)</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Jeff Wills	Senior Hydrogeologist	Brian Hobbs	Corporate Health and Safety Manager	
<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 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 or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant &amp; Nitriles</u> <input checked="" type="checkbox"/> OTHER: <u>Bug Spray, Sun Screen, Knee Pads or kneeling pad</u>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
9/16" Socket and Wrench, Non-Toxic Clay, Teflon-Lined Tubing, Masterflex Tubing, Air Pump with Low Flow, Dry Cal, Enclosure (Bucket with 2 holes), Helium Gas Canister, Summa Canisters and Flow Controllers, MultiRae Photo Ionization Detector (PID), Helium Detector, Tubing Cutter, 42-inch Safety Cones, Caution Tape or Retractable Cone Bars				
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.				
<b>Work Zone (WZ): A 5-foot exclusion zone will be maintained for non-essential personnel.</b>				
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>		
1. Define and secure work area.	<b>1a. FALL:</b> Potential tripping hazards.  <b>1b. CONTACT:</b> Potential contact with moving vehicles or pedestrians.  <b>1c. EXERTION:</b> Muscle strain while lifting and carrying equipment.	1a. Ensure work area is secure and inform others (third party) of work activity. 1a. Remove tripping hazards and inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. If working alongside roads, look both ways before entering roadways, face traffic, and utilize work vehicle to protect employees. 1b. Delineate work area (including vehicles) with traffic safety cones and caution tape or retractable cone bars. 1b. Maintain a 5-foot work zone. 1b. Wear high visibility clothing or reflective safety vest. 1c. When carrying equipment to/from work area, keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced. Use mechanical assistance/make multiple trips to carry equipment.		
2. Remove well cover / close well cover.	<b>2a. CONTACT/CAUGHT:</b> Pinch points and scrapes associated with hand tools and well covers.  <b>2b. FALL:</b> Potential tripping hazards associated with installing bolts.  <b>2c. EXERTION:</b> Physical exertion to remove bolts that were over torqued or stripped.	2a. Keep hands away from pinch points. 2a. Use hand tools with extensions to remove and replace well covers. 2a. Wear cut-resistant gloves. 2a. Use knee pads or kneeling pad when repetitive kneeling on rough ground is anticipated. 2b. Place security bolts in secure location so not to create tripping hazards. Replace security bolts so that they fit flush with monitoring well covers. 2c. Replace any security bolts that show signs of stripping. Do not over tighten. 2c. Use body positioning and bending techniques that minimize muscle strain; keep back straight, bend at the knees. 2c. See 2a.		

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<sup>2</sup> A hazard is a potential danger. Break hazards into six 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, tension/compression, 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 JOB STEPS	Analyze POTENTIAL HAZARDS	Act CRITICAL ACTIONS
3. Screen vapor point with PID.	<p><b>3a. FALL:</b> Potential tripping hazards associated with equipment.</p> <p><b>3b. EXPOSURE:</b> Inhalation of soil vapor</p>	<p>3a. Place equipment in one area close to the sampling location.</p> <p>3b. Identify area where equipment is to be stored within the work area (away from main walking path).</p> <p>3a. Don't leave equipment on the ground. Return equipment to storage area between uses.</p> <p>3b. Replace brass caps immediately upon completion to avoid soil vapors migrating to the surface through sample tubing.</p> <p>3b. Stand upwind of sample point during screening activities.</p>
4. Remove / replace brass caps at the end of the sample tubing.	<p><b>4a. CONTACT:</b> Pinch points associated with hand tools and brass caps.</p> <p><b>4b. EXPOSURE:</b> Potential pathway for vapors to migrate to land surface.</p>	<p>4a. Use wrench to remove and replace brass caps.</p> <p>4a. Wear cut-resistant gloves to protect against pinch points and scrapes.</p> <p>4b. See 3b.</p> <p>4b. Stand up wind of sample point location.</p>
5. Set up soil vapor sampling equipment and calibration of meters.	<p><b>5a. FALL:</b> Potential tripping hazards associated with equipment and tubing.5b.</p> <p><b>5b. CONTACT:</b> Pinch points associated with handling equipment.</p> <p><b>5c. EXPOSURE:</b> Inhalation of calibration gas and helium.</p>	<p>5a. See 3a.</p> <p>5a. Keep tubing slack to a minimum and locate the summa canister as close to the sampling location as possible.</p> <p>5a. Avoid stepping over equipment and tubing.</p> <p>5b. Do not place fingers/hands under sampling equipment.</p> <p>5b. Make multiple trips when unloading equipment in work area.</p> <p>5b. Wear cut-resistant gloves to protect against pinch points while handling sampling equipment.</p> <p>5c. Review SDS for each type of calibration gas used before calibrating.</p> <p>5c. Calibrate meters in a well-ventilated area and keep air flow regulator away from face.</p> <p>5c. Close valve on canisters after use to avoid inhalation of excess helium or calibration gas.</p> <p>5c. Stand up wind of bucket during helium tracer gas test.</p>
6. Cleaning Work Area.	<p><b>6a. FALL:</b> Potential tripping hazards associated with equipment and tubing.</p> <p><b>6b. CONTACT:</b> Storing and transport of equipment in car.</p>	<p>6a. See 3a.</p> <p>6a. See 3b.</p> <p>6b. Ensure that equipment is placed securely in the vehicle. Do not stack equipment on top of each other. Secure equipment so that it will not slide while being transported.</p> <p>6b. Wear cut-resistant gloves while handling/loading equipment.</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".

JOB SAFETY ANALYSIS		Ctrl. No. GEN-023	DATE: 7/10/2020	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>	WORK TYPE <b>Construction</b>	WORK ACTIVITY (Description) <b>Spotting Heavy Machinery</b>			
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE		
Levi Curnutte	Project Scientist	Brian Hobbs	Corporate Health & Safety Manager		
<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 type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel-/Composite-toe boots/shoes</u>	<input type="checkbox"/> Particulate Respirator <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Cut resistant / leather</u> <input type="checkbox"/> OTHER:		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Heavy Machinery (i.e. excavator, payload, truck, forklift, etc.)					
<b>COMMITMENT TO SAFETY-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs					
<b>EXCLUSION ZONE (EZ):</b> Maintain Minimum Heavy Equipment Exclusion Zone around equipment and loads while it is in motion. The HE EZ must be greater than the swing zone of any moving part of the equipment, tip zone of the equipment, fall zone of the equipment and contents, distance that debris may travel during demolition activities and/or foot print of a structure to be demolished.					
<b>Assess JOB STEPS</b>	<b>Analyze POTENTIAL HAZARDS</b>	<b>Act CRITICAL ACTIONS</b>			
1. Prepare for machine activity.	<b>1a. CONTACT:</b> Obstructions in the work area may create contact hazards from machinery.  <b>1b. Fall :</b> Slip/Trip/Fall	1a. Cordon off the work area with safety barrels/cones and a rigid barrier (snow fence, traffic bar, etc.). Communicate that only necessary personnel should be in the work area. Spotter and equipment operator shall enforce the <b>EZ</b> . Operator will not operate but shall remain in the hands-off mode while personnel are within the exclusion zone.  1b. Ensure that work area is flat, level and clear of any obstructions or debris before setting up work zone.			
2. Spotting.	<b>2a. CONTACT:</b> Machine or load contact with personnel, property, or machinery.	2a. Discuss the specifics of the work with the operator and be clear about any hand signals that will be used. Clearly discuss the limits of the assigned work area and the machine's Exclusion Zone. Maintain Exclusion Zone. The Exclusion Zone shall be delineated by using 42-inch traffic cones/barrels and a fixed rigid barrier.  2a. The Minimum Heavy Equipment Exclusion zone is greater than the swing/tip radius of equipment.  2a. Both the spotter and equipment operators shall have 2-way radios/cellular devices on their persons to ensure audible communication in the event any changes or new hazards may arise.  2a. All workers should stay outside of the Exclusion Zone of all equipment unless operator is stopped and in "Hands Off" mode. <b>(This includes the spotter unless an exception has been established in the Site-specific JSA)</b> . If the Exclusion Zone must be reduced due to work area restrictions then the spotter and operator shall enforce the reduced Exclusion Zone.  2a. Spotters must make eye contact with the machine operator or all movement ceases until visual contact can be reestablished.  2a. Spotter shall keep an eye out for any issues with the machine the operator may not see and communicate with other work crews and spotters on behalf of the operator.  2a. If the spotter needs to take a break, he must find a replacement before leaving or have the machine stop operations. <b>No heavy equipment shall operate without a spotter under any circumstances.</b>  2a. Wear fluorescent clothing/safety vest.			

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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".

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
	<p><b>2b. FALL:</b> Slip/Trip/Fall</p> <p><b>2c. CAUGHT:</b> Caught between machinery and nearby objects.</p> <p><b>2d. EXPOSURE:</b> Inhalation of exhaust from machinery.</p>	<p>2b. Look where walking to identify and avoid slip/trip/fall hazards. Avoid icy and/or wet surfaces. Remove obstacles if possible. 2b. Use designated walkways during spotting whenever possible.</p> <p>2c. <b>Maintain Exclusion Zone.</b> Do not stand between large, loose or fixed objects or structures and the machinery while it is in motion. Keep in sight of operator at all times while being aware of surrounding structures.</p> <p>2d. The spotter will position him/herself upwind of the working machinery, when possible. Spotter will also inform others working within the vicinity of the EZ of proper positioning, if applicable.</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-027</b>	<b>DATE: 11/3/2020</b>	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED	PAGE 1 of 2
<b>JSA TYPE CATEGORY</b> <b>GENERIC</b>		<b>WORK TYPE</b> <b>Drilling</b>	<b>WORK ACTIVITY (Description)</b> <b>Pre-Drilling Clearance, Vactron and Air Knife</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Courtney Rempfer	Staff Scientist		Joseph Midwig	Office Health & Safety Manager	
Sara Redding	Senior Hydrogeologist		Brian Hobbs	Corporate Health & Safety Manager	
<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: Composite toe or steel toe boots	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: Fluorescent reflective vest or high visibility clothing; long-sleeve shirt	<input checked="" type="checkbox"/> GLOVES: Leather, Nitrile, cut-resistant <input checked="" type="checkbox"/> OTHER: Dusk mask, insect repellent, sunscreen (as needed)		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Vac-Truck or Vac Drum, Compressor, Jack Hammer, Air Knife, Circular Saw, Hand Tools, Dust Mask, Photoionization Detector, Multi Gas Meter, 42 inch safety cones and flags, Retractable Cone Bars, Caution Tape, 20 lb. Fire Extinguisher, "Work Area" Signs, Pressurized Water Sprayer					
<b>Commitment to Safety – All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs</b>					
<b>EXCLUSION ZONE: All non-essential personnel will maintain a distance of 10 feet from drilling equipment while equipment is moving/engaged</b>					
<b>Assess JOB STEPS</b>	<b>Analyze POTENTIAL HAZARDS</b>	<b>Act CRITICAL ACTIONS</b>			
1. Verify pre-clearance protocol	<p><b>1a. CONTACT:</b> Underground utility damage; property damage; personal injury</p> <p><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.</p> <p><b>1c. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones.</p>	<p>1a. Confirm that (if applicable) "Call Before You Dig" and local utility companies were contacted prior to starting work in order to confirm utility mark outs. Must have a case # before digging.</p> <p>1a. Walk the Site to evaluate utility markings and review maps (see Site Walk Inspection JSA). Utilities are not always properly marked out ensure use of observational skills through the pre-clearing checklist.</p> <p>1a. Review pre-clearing checklist fromm 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 10 vertical feet below ground surface in the critical zone using hand tools.</p> <p>1b. Pre-clearing of each soil boring/monitoring well 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 and hand auger) prior to drilling. Supervisor should be contacted to discuss appropriate pre-clearing depth.</p> <p><b>1b. MUST Complete subsurface clearance checklist prior to pre-clearance.</b></p> <p>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.</p>			
2. Mobilize/demobilize and establish work area	<b>2a. SEE MOBILIZATION / DEMOBILIZATION JSA</b>	2a. See Mobilization / Demobilization JSA			
3. Concrete saw cutting, jack hammer and hand clearance with hand tools, air knife	<p><b>3a. CONTACT:</b> Flying debris striking face or body</p> <p><b>3b. EXPOSURE:</b> Inhalation/exposure to hazardous vapors and/or concrete dust, noise exposure</p> <p><b>3c. ENERGY SOURCE/CONTACT:</b> Property damage; Pressurized water</p>	<p>3a. Maintain 10' minimum exclusion zone. Use the required PPE (i.e., leather/cut proof gloves, safety glasses/face shield).</p> <p>3a. Use anti-whip devices on compressor hoses.</p> <p>3a. Wear a face shield to protect face from flying debris when using air knife.</p> <p>3a. Utilize a traffic cone or physical barriers over the hole during air knife activities to keep flying debris close to ground.</p> <p>3b. Monitor breathing zone with a calibrated PID and/or multi-gas meter. If meters sustain readings greater than recommended in the HASP for the specific contaminant of concerns (COCs) the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings. Contact PM.</p> <p>3b. Wet concrete while using saw to minimize dust and wear dust mask to prevent inhalation.</p> <p>3b. Stand upwind and keep body behind saw. Observers and helpers should avoid line of fire for saw blade. Always cut away from body.</p> <p>3b. No open flames/heat sources.</p> <p>3b. Wear hearing protection when saw, jackhammer or air compressor are in operation. Otherwise, if sound levels exceed 85 dbA, put on hearing protection.</p>			

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	<p>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.</p> <p><b>3d. ERGONOMICS/EXERTION:</b> Muscle strain due to poor body positioning when handling equipment and materials</p> <p><b>3e. FALL:</b> Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site</p> <p><b>3f. CAUGHT:</b> Amputation points associated with the equipment and vacuum hose</p>	<p>3c. For air knitting, ensure extension/lance tip reaches the full 5 feet bgs. Air knife should be advanced <b>AT A MINIMUM</b> in all four corners of the expected boring location to find any possible arrangement of utilities.</p> <p>3c. Ensure diameter of soil preclearance hole is at a <b>MINIMUM 2x</b> the diameter of any drilling or hard dig equipment that will be entering the hole.</p> <p>3c. <b>See Complete subsurface clearance protocol for information provided above.</b></p> <p>3d. Use body positioning and lifting techniques that minimizes muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load.</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 lbs. or when the shape makes the object difficult to lift.</p> <p>3e. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. Mob/Demob JSA.</p> <p>3e. Do not climb over stored materials/equipment; walk around. 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 and compressed air lines are grouped when used within the work area.</p> <p>3e. Pre-cleared location will be finished flush to grade as to prevent a slip/trip hazard or coned and taped off.</p> <p>3f. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting 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. Inspect saw blade for worn surface or missing teeth; switch blade if damaged or blunt.</p> <p>3f. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>3f. All non-essential personnel shall maintain a 10 foot exclusion zone; position body out of the line-of-fire of equipment.</p> <p>3f. Drillers and helpers will understand and use the "Show Me Your Hands Policy".</p>
<p>4. Move drum to staging area using drum cart</p>	<p><b>4a. EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil)</p> <p><b>4b. EXERTION:</b> Muscle strain while maneuvering drums with drum cart/lift gate</p> <p><b>4c. CAUGHT: Pinch points associated with handling drum lid</b></p>	<p>4a. Wear Nitrile chemical-resistant gloves under leather or cut proof gloves.</p> <p>4a. Do not overfill drums. Ensure that the drum lids are attached securely.</p> <p>4a. All drums will be staged in the designated storage area.</p> <p>4b. See 3d. Do not overfill drums. Use lift gate on back of truck to load and unload drums. Use drum dolly to move drum.</p> <p>4c. Ensure that fingers are not placed under the lid of the drum. Wear leather gloves or cut proof gloves. Use appropriate ratchet while sealing drum lid.</p>
<p>5. Decontaminate equipment.</p>	<p><b>5a. EXPOSURE/CONTACT:</b> To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p><b>5b. EXPOSURE:</b> To chemicals in cleaning solution.</p>	<p>5a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>5a. Contain decontamination water so that it does not spill.</p> <p>5a. Use an absorbent pad to clean spills, if necessary.</p> <p>5a. Spray equipment from side angle, not straight on, to avoid backsplash.</p> <p>5a. See 3b.</p> <p>5b. See 4a. Review SDS to ensure appropriate precautions are taken and understood.</p>

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**Site-Specific Health and Safety Plan**  
**148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX B**

SDSs for Chemicals Used

Effective date: 11 May 2020  
Trade Name: Alconox®

Revision: 11 May 2020

## I Identification of the substance/mixture and of the supplier

### I.1 GHS Product identifier

Trade Name: Alconox®  
Product number: 1101, 1103, 1104, 1104-1, 1112, 1112-1, 1125, 1150

### I.2 Application of the substance / the mixture: Cleaning material/Detergent

I.2.1 Recommended dilution ratio: 1 – 2% in water

### I.3 Details of the supplier of the Safety Data Sheet

**Manufacturer:**

Alconox Inc.  
30 Glenn St  
White Plains, NY 10603  
(914) 948-4040

**Supplier:**

**Emergency telephone number:**

ChemTel Inc  
North America: 1-888-255-3924  
International: +1 813-248-0573

## 2 Hazards identification

### 2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272, 29CFR1910/1200 and GHS requirements.

**Hazard-determining components of labeling:**

Tetrasodium Pyrophosphate  
Sodium tripolyphosphate  
Sodium Alkylbenzene Sulfonate

### 2.2 Label elements:

Eye damage, category 1.  
Skin irritation, category 2.

**Product at recommended dilution:**

Eye irritation, category 2B

**Hazard pictograms:**



**Signal word:** Danger

**Hazard statements:**

H315 Causes skin irritation.  
H318 Causes serious eye damage.

**Precautionary statements:**

P264 Wash skin thoroughly after handling.

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Trade Name: Alconox®

- P280 Wear protective gloves/protective clothing/eye protection/face protection.  
 P302+P352 If on skin: Wash with soap and water.  
 P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.  
 P321 Specific treatment (see supplemental first aid instructions on this label).  
 P332+P313 If skin irritation occurs: Get medical advice/attention.  
 P362 Take off contaminated clothing and wash before reuse.  
 P501 Dispose of contents and container as instructed in Section 13.

**Hazardous Elements at Use Dilution:**

Hazard Pictograms:

**Signal Word:** Warning**Hazard Statements:**

H320 Causes eye irritation

**Precautionary statements:**

- P302+P352 If on skin: Wash with soap and water.  
 P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.  
 P501 Dispose of contents and container as instructed in Section 13

**Additional information:** None.**Hazard description**

**Hazards Not Otherwise Classified (HNOC):** May cause surfaces to become slippery if wet. Use caution in areas of foot traffic if on floors.

**Information concerning particular hazards for humans and environment:**

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

**Classification system:**

The classification is according to EC regulation No. 1272, 29CFR1910/1200 and GHS Requirements, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists and is supplemented by information from technical literature and by information provided by the company.

**3 Composition/information on ingredients**

**3.1 Chemical characterization:** Not determined or not available.

**3.2 Description:** None

**3.3 Hazardous components (percentages by weight)**

Identification	Chemical Name	Classification	Wt. %
<b>CAS number:</b> 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2; H315 Eye Irrit. 2; H319	12-28
<b>CAS number:</b> 68081-81-2 or 68411-30-3	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2; H315 Eye Dam. 1; H318	8-22
<b>CAS number:</b> 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2; H315 Eye Irrit. 2; H319	2-16

**Effective date:** 11 May 2020  
**Trade Name:** Alconox®

**Revision:** 11 May 2020

Hazardous components at use dilution (percentages by weight):

Identification	Chemical Name	Classification	Wt. %
<b>CAS number:</b> 7758-29-4	Sodium tripolyphosphate	Eye Irrit. 2; H319	0.12 - 0.28
<b>CAS number:</b> 68081-81-2 or 68411-30-3	Sodium Alkylbenzene Sulfonate	Eye Irrit. 2; H319	0.08 – 0.22
<b>CAS number:</b> 7722-88-5	Tetrasodium Pyrophosphate	Eye Irrit. 2; H319	0.02 – 0.16

**3.4 Additional Information:** None.

#### 4 First aid measures

##### 4.1 Description of first aid measures

**General information:** None.

**After inhalation:**

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

**After skin contact:**

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

**After eye contact:**

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

**After swallowing:**

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

##### 4.2 Most important symptoms and effects, both acute and delayed

None

##### 4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

#### First aid measure at recommended dilution:

**General information:** None.

**After inhalation:**

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

**After skin contact:**

Wash affected area with soap and water.

**After eye contact:**

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

**After swallowing:**

Rinse mouth thoroughly. Seek medical attention if irritation, discomfort, or vomiting develops.

#### 5 Firefighting measures

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### 5.1 Extinguishing media

**Suitable extinguishing agents:**

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

**For safety reasons unsuitable extinguishing agents:** None

### 5.2 Special hazards arising from the substance or mixture:

Thermal decomposition can lead to release of irritating gases and vapors.

### 5.3 Advice for firefighters

**Protective equipment:**

Wear protective eye wear, gloves and clothing.

Refer to Section 8.

### 5.4 Additional information:

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.

Avoid contact with skin, eyes and clothing.

## 6 Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures:

Ensure adequate ventilation.

Ensure air handling systems are operational.

### 6.2 Environmental precautions:

Should not be released into the environment.

Prevent from reaching drains, sewer or waterway.

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

Wear protective eye wear, gloves and clothing.

### 6.4 Reference to other sections: None

## 7 Handling and storage

### 7.1 Precautions for safe handling:

No expected hazards under normal use condition.

Avoid breathing mist or vapor if aerosolized.

Do not eat, drink, smoke or use personal products when handling chemical substances.

### 7.2 Conditions for safe storage, including any incompatibilities:

Store in a cool, well-ventilated area.

### 7.3 Specific end use(s):

No additional information.

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**8 Exposure controls/personal protection**



**8.1 Control parameters:**

- a) 7722-88-5, Tetrasodium Pyrophosphate, ACGIH TWA 10 mg/m<sup>3</sup>
- b) 7758-29-4, Sodium Tripolyphosphate, ACGIH TWA 10 mg/m<sup>3</sup>
- c) Dusts, non-specific OEL, Irish Code of Practice
  - (i) Total inhalable 10 mg/m<sup>3</sup> (8hr)
  - (ii) Respirable 4 mg/m<sup>3</sup> (8hr)
  - (iii) Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m<sup>3</sup>, (8hr)

**8.2 Exposure controls**

**Appropriate engineering controls:**

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

**Respiratory protection:**

Not needed under normal use conditions.

**Protection of skin:**

Select glove material impermeable and resistant to the substance.

**Eye protection:**

Safety goggles or glasses, or appropriate eye protection. Recommended to comply with ANSI Z87.1 and/or EN 166.

**General hygienic measures:**

Wash hands before breaks and at the end of work.  
 Avoid contact with skin, eyes and clothing.

**Exposure Control and Personal Protective Equipment at recommended dilution:**

Under normal use and operational conditions, no special personal protective equipment or engineering controls will be necessary. Handle with care.

**9 Physical and chemical properties**

<b>Appearance (physical state, color):</b>	White and cream colored flakes - powder	<b>Explosion limit lower:</b> <b>Explosion limit upper:</b>	Not determined or not available. Not determined or not available.
<b>Odor:</b>	Not determined or not available.	<b>Vapor pressure at 20°C:</b>	Not determined or not available.
<b>Odor threshold:</b>	Not determined or not available.	<b>Vapor density:</b>	Not determined or not available.
<b>pH-value:</b>	9.5 (1% aqueous solution)	<b>Relative density:</b>	Not determined or not available.

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<b>Melting/Freezing point:</b>	Not determined or not available.	<b>Solubilities:</b>	Not determined or not available.
<b>Boiling point/Boiling range:</b>	Not determined or not available.	<b>Partition coefficient (n-octanol/water):</b>	Not determined or not available.
<b>Flash point (closed cup):</b>	Not determined or not available.	<b>Auto/Self-ignition temperature:</b>	Not determined or not available.
<b>Evaporation rate:</b>	Not determined or not available.	<b>Decomposition temperature:</b>	Not determined or not available.
<b>Flammability (solid, gaseous):</b>	Not determined or not available.	<b>Viscosity:</b>	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
<b>Density at 20°C:</b>	Not determined or not available.		

## 10 Stability and reactivity

- 10.1 Reactivity:** Not determined or not available.  
**10.2 Chemical stability:** Not determined or not available.  
**10.3 Possibility hazardous reactions:** Not determined or not available.  
**10.4 Conditions to avoid:** Not determined or not available.  
**10.5 Incompatible materials:** Not determined or not available.  
**10.6 Hazardous decomposition products:** Not determined or not available.

## 11 Toxicological information

### 11.1 Information on toxicological effects:

#### Acute Toxicity:

##### Oral:

: LD50 > 5000 mg/kg oral rat - Product.

**Chronic Toxicity:** No additional information.

#### Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

#### Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye damage.

Tetrasodium Pyrophosphate: Risk of serious damage to eyes.

#### Product information at recommended dilution:

Eye irritation may occur upon direct contact with eyes. No specific hazards for skin contact, inhalation, or chronic exposure are expected within normal use parameters.

**Respiratory or skin sensitization:** No additional information.

**Carcinogenicity:** No additional information.

**IARC (International Agency for Research on Cancer):** None of the ingredients are listed.

**NTP (National Toxicology Program):** None of the ingredients are listed.

**Germ cell mutagenicity:** No additional information.

**Reproductive toxicity:** No additional information.

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**STOT-single and repeated exposure:** No additional information.

**Additional toxicological information:** No additional information.

**12 Ecological information**

**12.1 Toxicity:**

- Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
- Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.9 mg/l, 48 hours.
- Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
- Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
- Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

**12.2 Persistence and degradability:** No additional information.

**12.3 Bioaccumulative potential:** No additional information.

**12.4 Mobility in soil:** No additional information.

**General notes:** No additional information.

**12.5 Results of PBT and vPvB assessment:**

- PBT:** No additional information.
- vPvB:** No additional information.

**12.6 Other adverse effects:** No additional information.

**13 Disposal considerations**

**13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)**

**Relevant Information:**

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

**14 Transport information**

<b>14.1 UN Number:</b> ADR, ADN, DOT, IMDG, IATA	None																
<b>14.2 UN Proper shipping name:</b> ADR, ADN, DOT, IMDG, IATA	None																
<b>14.3 Transport hazard classes:</b> ADR, ADN, DOT, IMDG, IATA	<table border="0"> <tr> <td><b>Class:</b></td> <td>None</td> </tr> <tr> <td><b>Label:</b></td> <td>None</td> </tr> <tr> <td><b>LTD. QTY:</b></td> <td>None</td> </tr> </table>	<b>Class:</b>	None	<b>Label:</b>	None	<b>LTD. QTY:</b>	None										
<b>Class:</b>	None																
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<hr/> <table border="0"> <tr> <td><b>US DOT</b></td> <td></td> </tr> <tr> <td><b>Limited Quantity Exception:</b></td> <td>None</td> </tr> <tr> <td><b>Bulk:</b></td> <td><b>Non Bulk:</b></td> </tr> <tr> <td><b>RQ (if applicable):</b> None</td> <td><b>RQ (if applicable):</b> None</td> </tr> <tr> <td><b>Proper shipping Name:</b> None</td> <td><b>Proper shipping Name:</b> None</td> </tr> <tr> <td><b>Hazard Class:</b> None</td> <td><b>Hazard Class:</b> None</td> </tr> <tr> <td><b>Packing Group:</b> None</td> <td><b>Packing Group:</b> None</td> </tr> <tr> <td><b>Marine Pollutant (if applicable):</b> No additional information.</td> <td><b>Marine Pollutant (if applicable):</b> No additional information.</td> </tr> </table>		<b>US DOT</b>		<b>Limited Quantity Exception:</b>	None	<b>Bulk:</b>	<b>Non Bulk:</b>	<b>RQ (if applicable):</b> None	<b>RQ (if applicable):</b> None	<b>Proper shipping Name:</b> None	<b>Proper shipping Name:</b> None	<b>Hazard Class:</b> None	<b>Hazard Class:</b> None	<b>Packing Group:</b> None	<b>Packing Group:</b> None	<b>Marine Pollutant (if applicable):</b> No additional information.	<b>Marine Pollutant (if applicable):</b> No additional information.
<b>US DOT</b>																	
<b>Limited Quantity Exception:</b>	None																
<b>Bulk:</b>	<b>Non Bulk:</b>																
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<b>Packing Group:</b> None	<b>Packing Group:</b> None																
<b>Marine Pollutant (if applicable):</b> No additional information.	<b>Marine Pollutant (if applicable):</b> No additional information.																

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<b>Comments:</b> None	<b>Comments:</b> None
<b>I4.4 Packing group:</b> ADR, ADN, DOT, IMDG, IATA	None
<b>I4.5 Environmental hazards:</b>	None
<b>I4.6 Special precautions for user:</b> <b>Danger code (Kemler):</b> <b>EMS number:</b> <b>Segregation groups:</b>	None None None None
<b>I4.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:</b> Not applicable.	
<b>I4.8 Transport/Additional information:</b>  <b>Transport category:</b> <b>Tunnel restriction code:</b> <b>UN "Model Regulation":</b>	
	None None None

**I5 Regulatory information**

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

**North American**

<b>SARA</b> <b>Section 313 (specific toxic chemical listings):</b> None of the ingredients are listed. <b>Section 302 (extremely hazardous substances):</b> None of the ingredients are listed.
<b>CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable</b> <b>Spill Quantity:</b> None of the ingredients are listed.
<b>TSCA (Toxic Substances Control Act):</b> <b>Inventory:</b> All ingredients are listed as active. <b>Rules and Orders:</b> Not applicable.
<b>Proposition 65 (California):</b> <b>Chemicals known to cause cancer:</b> None of the ingredients are listed. <b>Chemicals known to cause reproductive toxicity for females:</b> None of the ingredients are listed. <b>Chemicals known to cause reproductive toxicity for males:</b> None of the ingredients are listed. <b>Chemicals known to cause developmental toxicity:</b> None of the ingredients are listed.

<b>Canadian</b> <b>Canadian Domestic Substances List (DSL):</b> All ingredients are listed.
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**EU**

<b>REACH Article 57 (SVHC):</b> None of the ingredients are listed.
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**Germany MAK:** Not classified.

**EC 648/2004** – This is an industrial detergent. Contains >30% phosphate, 15-30% anionic surfactant, <5% EDTA salts

**EC 551/2009** – This is not a laundry or dishwasher detergent

**EC 907/2006** – Contains no enzymes, optical brighteners, perfumes, allergenic fragrances, or preservative agents

## Asia Pacific

### Australia

**Australian Inventory of Chemical Substances (AICS):** All ingredients are listed.

### China

**Inventory of Existing Chemical Substances in China (IECSC):** All ingredients are listed.

### Japan

**Inventory of Existing and New Chemical Substances (ENCS):** All ingredients are listed.

### Korea

**Existing Chemicals List (ECL):** All ingredients are listed.

### New Zealand

**New Zealand Inventory of Chemicals (NZOIC):** All ingredients are listed.

### Philippines

**Philippine Inventory of Chemicals and Chemical Substances (PICCS):** All ingredients are listed.

### Taiwan

**Taiwan Chemical Substance Inventory (TSCI):** All ingredients are listed.

## 16 Other information

**Abbreviations and Acronyms:** None

### Summary of Phrases

**Hazard statements:**

H315 Causes skin irritation.  
H318 Causes serious eye damage.

**NFPA:** 1-0-0

**HMIS:** 1-0-0

**At recommended dilution:**

**NFPA:** 1-0-0

**HMIS:** 1-0-0

**Precautionary statements:**

P264 Wash skin thoroughly after handling.  
P280 Wear protective gloves/protective clothing/eye protection/face protection.  
P302+P352 If on skin: Wash with soap and water.  
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.  
P321 Specific treatment (see supplemental first aid instructions on this label).  
P332+P313 If skin irritation occurs: Get medical advice/attention.  
P362 Take off contaminated clothing and wash before reuse.  
P501 Dispose of contents and container as instructed in Section 13.

**Manufacturer Statement:**

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 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.

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**Section 1 - Product and Company Identification**

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**Product Identifiers:**

<b>Product name:</b>	<b>Repel Insect Repellent Sportsmen Max Formula 40% DEET</b>
<b>EPA reg. number:</b>	305-46
<b>Recommended product use:</b>	Insect Repellent - Aerosol

**Details of the Supplier of the Safety Data Sheet:**

<b>Manufacturer/Supplier:</b>	Chemsico Div. of United Industries Corp. P.O. Box 142642 St. Louis, MO 63114
<b>For product information:</b>	1-800-880-1181
<b>For medical emergencies:</b>	1-800-633-2873

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**Section 2 - Hazards Identification**

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Conforms to Hazard Communication Standard 29 CFR 1910.1200.

**GHS Classification of Substance or Mixture:** Flammable aerosol - Category 2**GHS Label Elements:**

Hazard pictogram(s):



Signal word:

WARNING

Hazard statements:

- Flammable aerosol
- Compressed gas – contents under pressure; may burst if heated
- Causes eye irritation
- Harmful if swallowed
- May cause an allergic skin reaction

**Precautionary Statements:**

- Contents under pressure.
- Do not use or store near heat or open flame.
- Do not puncture or incinerate container.
- Exposure to temperatures above 130°F may cause bursting.
- 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.
- Wash hands with soap and water after handling. Do not eat, drink or smoke when using this product. If swallowed: Call a poison control center or doctor for treatment advice if you feel unwell. Rinse mouth.
- If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

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**Section 3 - Composition / Information on Ingredients**


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Chemical Name	CAS#	Weight Percent
DEET (N,N-Diethyl-m-toluamide)	134-62-3	40.0%
Ethanol	64-17-5	20.0%
Isobutane	75-28-5	10.0%

Note: Ingredients not identified are proprietary or non-hazardous. Values are not product specifications.

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**Section 4 - First Aid Measures**


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<b>Eye contact:</b>	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for treatment advice.
<b>Skin contact:</b>	After returning indoors, wash treated skin with soap and water. Discontinue use if irritation or rash occurs.
<b>Inhalation:</b>	No special requirements
<b>Ingestion:</b>	Call a poison control center or doctor immediately for treatment advice. Have person sip if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
<b>Note to Physician:</b>	None
<b>General advice:</b>	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Keep out of reach of children.

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**Section 5 - Fire Fighting Measures**


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<b>Flammable properties:</b>	Pressurized aerosol container
<b>NFPA classification:</b>	NFPA level 1 aerosol
<b>Suitable extinguishing media:</b>	Water fog, foam, CO <sub>2</sub> , dry chemical
<b>Unsuitable extinguishing media:</b>	Not available
<b>Specific hazards arising from the chemical:</b>	Contents under pressure – container may burst in heat of fire.
<b>Protective equipment for firefighters:</b>	Firefighters should wear full protective clothing including self-contained breathing apparatus.
<b>Hazardous combustion products:</b>	None known
<b>Explosion data:</b>	Not available
<b>Sensitivity to static discharge:</b>	Not available
<b>Personal precautions:</b>	Keep unnecessary personnel away. Do not touch or walk through spilled material.

**Section 6 - Accidental Release Measures**

**Personnel precautions:** Remove all sources of ignition. Wear personnel protective equipment as recommended in Section 8. Wash thoroughly after handling.

**For emergency responders:** If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials.

**Environmental precautions:** Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

**Methods for containment and cleaning up:** Stop leak if without risk. Move containers from spill area. Before attempting clean up, refer to hazard data given above. Small spills may be absorbed with earth, sand or absorbent material swept up and placed in suitable, covered, and labeled containers. Prevent large spills from entering sewers or waterways. Contact emergency services and supplier for advice. Never return spills in original containers for re-use.

**Section 7 - Handling and Storage**

**Precautions for safe handling:** Put on appropriate personal protective equipment as recommended in Section 8. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C (122°F). Do not pierce or burn, even after use. Do not ingest. Avoid contact with skin, eyes and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous.

**Storage:** Store in a cool, dry area away from open flame. Do not store above 50°C (122°F).

**Section 8 - Exposure Controls / Personal Protection**

**Exposure guidelines:**

Components with Occupational Exposure Limits							
		Exposure Limits					
		OSHA PEL		ACGIH TLV		Supplier OEL	
Chemical name		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
DEET	TWA	None		None		None	
Ethanol	TWA	1000	1900	1000	-----	1000	1900
Isobutane	TWA	Not established		1000	-----	Not established	

**Engineering controls:** General ventilation normally adequate.

**Personal protective equipment:**

**Eye/Face protection:** During application, prevent entry into eyes. Wear safety glasses with side shields if using in large applications.

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<b>Skin and body protection:</b>	After returning indoors, wash treated skin with soap and water.
<b>Respiratory protection:</b>	Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.
<b>General hygiene considerations:</b>	Handle in accordance with good industrial hygiene and safety practices. When using, do not eat or drink. Wash hands before breaks and immediately after handling the product.

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### Section 9 - Physical & Chemical Properties

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<b>Appearance:</b>	Clear
<b>Color:</b>	Colorless to pale yellow
<b>Physical state:</b>	Pressurized liquid
<b>Odor:</b>	Ethanol & DEET
<b>Odor threshold:</b>	No data available
<b>pH:</b>	8.3 (liquid portion)
<b>Melting point:</b>	No data available
<b>Freezing point:</b>	No data available
<b>Boiling point:</b>	No data available
<b>Flash point:</b>	85°F (liquid portion)
<b>Flame Extension</b>	18" (level 1 aerosol)
<b>Flammability limits in air, lower, % by volume:</b>	No data available
<b>Flammability limits in air, upper, % by volume:</b>	No data available
<b>Vapor pressure:</b>	No data available
<b>Vapor density:</b>	No data available
<b>Relative density @ 20°C:</b>	0.922 (liquid portion)
<b>Octanol/water coefficient:</b>	No data available
<b>Auto-ignition temperature:</b>	No data available
<b>Decomposition temperature:</b>	No data available
<b>Solubility:</b>	Miscible in water
<b>Evaporation rate:</b>	No data available
<b>% Volatile organic compounds:</b>	30.2

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### Section 10 - Chemical Stability & Reactivity Information

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#### Reactivity

<b>Conditions to avoid:</b>	Do not mix with other chemicals.
<b>Incompatible materials:</b>	Avoid strong oxidizers.

#### Chemical stability

<b>Product stability:</b>	Stable under recommended storage conditions.
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**Other**

<b>Hazardous decomposition products:</b>	None known
<b>Possibility of hazardous reactions:</b>	Hazardous polymerization does not occur.

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**Section 11 - Toxicological Information**

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<b>Primary eye irritation:</b>	Causes substantial but temporary eye injury (EPA tox. category II)
<b>Primary skin irritation:</b>	Non-irritating (EPA tox. category IV)
<b>Acute dermal:</b>	LD <sub>50</sub> > 5000 mg/kg (EPA tox. category IV)
<b>Acute inhalation:</b>	LC <sub>50</sub> > 2 mg/L (EPA tox. category IV)
<b>Acute oral:</b>	LD <sub>50</sub> > 2000 mg/kg (EPA tox. category III)
<b>Sensitization:</b>	Not a skin sensitizer.
<b>Chronic effects/ Carcinogenicity:</b>	No data available
<b>Mutagenicity:</b>	No data available
<b>Reproductive effects:</b>	No data available
<b>Teratogenicity:</b>	No data available
<b>Ecotoxicity:</b>	No data available

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**Section 12 - Ecological Information**

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<b>Environmental effects:</b>	No data available
<b>Aquatic toxicity:</b>	None
<b>Persistence / degradability:</b>	No data available
<b>Bioaccumulation / accumulation:</b>	No data available
<b>Partition coefficient:</b>	No data available
<b>Mobility in environmental media:</b>	No data available
<b>Chemical fate information:</b>	No data available

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**Section 13 - Disposal Considerations**

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<b>Waste codes:</b>	Not available
<b>Disposal instructions:</b>	Dispose in accordance with all applicable regulations.
<b>Waste from residues / unused products:</b>	Not available
<b>Contaminated packaging:</b>	Not available

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**Section 14 - Transportation Information**

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<b>U.S. Department of Transportation (DOT):</b>	UN-1950, Aerosols, Flammable, 2.1, Limited Quantity
<b>IATA:</b>	UN-1950, Aerosols, 2.1
<b>IMDG:</b>	UN-1950, Aerosols, Flammable, Limited Quantity

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**Section 15 - Regulatory Information**


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**29 CFR 1910.1200 hazardous chemical****Occupational Safety and Health****Administration (OSHA):** No**CERCLA (Superfund) reportable quantity:**

Not available

**Hazard categories****Superfund Amendments and Reauthorization Act of 1986 (SARA):**

Immediate Hazard No

Delayed Hazard No

Fire Hazard No

Pressure Hazard No

Reactivity Hazard No

**Section 302 extremely hazardous****Substance:** No**Section 311 hazardous chemical:** No**Clean Air Act (CAA):** Not available**Clean Water Act (CWA):** Not available**State regulations:**

**FIFRA labeling:** This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

**Signal word:** CAUTION

**Precautionary statements:** Causes substantial but temporary eye injury. Do not get in eyes. Harmful if swallowed. Use of this product may cause skin reactions in rare cases. Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

FLAMMABLE. Contents under pressure. Keep away from heat, sparks and open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting. Do not apply to synthetic fabrics such as acetate, rayon or spandex. Will not damage cotton, wool or nylon. May damage furniture finishes, leather, plastics and painted and varnished surfaces, including watch crystals, guns, bows and automobiles.

**Notification status:** All ingredients of this product are listed or are excluded from listing on the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

**California Prop. 65:** This product does not contain any chemicals known to the state of California to cause cancer, birth defects or any other reproductive harm.

**Disclaimer:** Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or

consequential damages which may result from the use of or reliance on any information contained in this document.

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**Section 16 - Other Information**

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<b>HMIS ratings:</b>	Health Hazard 1	Flammability 3	Physical Hazard 0
<b>Item numbers:</b>	HG-33801; HG-83801; HG-94102		
<b>Issue date:</b>	2/22/2016		
<b>Prepared by:</b>	WPC Brands, Inc. P.O. Box 4406 Bridgeton, MO 63044-0406 (800) 242-1166		

# Safety Data Sheet Ready Mix Concrete

## Section 1. Identification

<b>GHS product identifier:</b>	Ready Mix Concrete
<b>Other means of identification:</b>	Concrete, Colored Concrete, Freshly Mixed Concrete
<b>Relevant identified uses of the substance or mixture and uses advised against:</b>	Ready Mix Concrete is used in the construction of various structures and objects.
<b>Supplier's details:</b>	Lehigh Hanson 300 E. John Carpenter Freeway, Suite 1645 Irving, TX 75062 (972) 653-5500
<b>Emergency telephone number (24 hours):</b>	<b>CHEMTREC: (800) 424-9300</b>

## Section 2. Hazards Identification

<b>GHS Classification:</b>	CARCINOGENICITY – Category 1A SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) – Category 2 SKIN CORROSION/IRRITATION – Category 1C SERIOUS EYE DAMAGE/EYE IRRITATION – Category 1 SKIN SENSITIZATION – Category 1
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### GHS label elements

**Hazard pictograms:**



<b>Signal word:</b>	Danger
<b>Hazard statements:</b>	May cause cancer May cause damage to organs (lung) through prolonged or repeated exposure Causes severe skin burns and eye damage Causes serious eye irritation May cause an allergic skin reaction

**Precautionary statements:**

<b>Prevention:</b>	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wash any exposed body parts thoroughly after handling. Avoid breathing dust. Contaminated clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection.
<b>Response:</b>	If exposed or concerned: Get medical advice/attention if irritation or rash occurs. If on skin: Take off immediately all contaminated clothing. Rinse/wash skin with plenty of water/shower. Wash contaminated clothing before reuse. If in eyes: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do.
<b>Storage:</b>	Restrict or control access to ready mix concrete (store locked up).
<b>Disposal:</b>	Dispose of contents/container in accordance with local/regional/national/international regulations.
<b>Hazards not otherwise classified (HNOC):</b>	None known
<b>Supplemental Information:</b>	Respirable Crystalline Silica (RCS) may cause cancer. Wet, freshly mixed concrete is not expected to pose respiratory concern. Ready Mix Concrete is comprised of cement, additives and a naturally occurring mineral complex that contains varying quantities of quartz (crystalline silica). When set/cured Ready Mix Concrete is subjected to various natural or mechanical forces it may produce small particles (dust) which may contain respirable crystalline silica (particles less than 10 micrometers in aerodynamic diameter). Repeated

inhalation of respirable crystalline silica (quartz) may cause lung cancer according to IARC and NTP; ACGIH states that it is a suspected cause of cancer. Other forms of RCS (e.g., tridymite and cristobalite) may also be present or formed under certain industrial processes.

### Section 3. Composition/information on ingredients

**Substance/mixture:** Ready Mix Concrete

#### CAS number/other identifiers

Ingredient name	%	CAS number
Aggregates	> 35	Varies
Portland Cement	> 25	65997-15-1
Ashes	0 – 25	Varies
Water	> 5	7732-18-5
Crystalline Silica (Quartz)	> 0.1	14808-60-7

Any concentration shown as a range is to protect confidentiality or is due to process variation. Portland Cement may contain trace (< 0.05%) amounts of chromium salts or compounds (including hexavalent chromium) or other metals (including nickel compounds) found to be hazardous or toxic in some chemical forms. These metals are present mostly as trace substitutions within the principal minerals. Other trace constituents may include potassium and sodium sulfate compounds. There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

### Section 4. First aid measures

#### Description of necessary first aid measures

<b>Eye Contact:</b>	If exposed or concerned: get medical attention. Do not allow individual to rub eyes. Flush eyes gently under running water for 15 minutes or longer, making sure that the eyelids are held open. Other than washing with water, do not attempt to remove material from eyes. Remove contact lenses, if present and easy to do. Obtain medical attention for eye contact with wet concrete.
<b>Inhalation:</b>	Move exposed individual to fresh air. Dust in throat and nasal passages should clear naturally by coughing, sneezing and nasal discharge. Obtain medical attention if symptoms persist or develop later.
<b>Skin Contact:</b>	Wash affected areas with water and soap. Remove contaminated clothing and wash before reuse. If irritation persists or develops later, obtain medical attention.
<b>Ingestion:</b>	Ingestion is not a common route of occupational exposure. If swallowed and irritation or discomfort occurs, obtain medical attention.

#### Most important symptoms/effects, acute and delayed potential acute health effects

<b>Eye contact:</b>	Exposure to dust from dry ingredients or hardened cement can cause irritation and tearing of the eyes. Exposure to wet concrete may result in irritation or burns.
<b>Inhalation:</b>	Symptoms of exposure may include upper respiratory discomfort with coughing and sneezing. Inhalation may cause upper respiratory tract infection. A "rare" acute form of silicosis may develop from inhalation of extremely high concentrations of crystalline silica over a period of several months to five years.
<b>Skin contact:</b>	Ready Mix Concrete contains Portland Cement, which may contain trace amounts of hexavalent chromium and is linked with allergic sensitization reactions in some individuals. These reactions may lead to contact dermatitis and skin ulceration. Exposure to dust from dry ingredients or hardened cement can cause skin irritation, dermatitis and/or redness to the exposed skin. Wet concrete exhibits caustic, abrasive and dehydrating properties. Irritation or pain may be delayed for several hours and cannot be relied upon as an indication of exposure.
<b>Ingestion:</b>	Ingestion is not a common route of occupational exposure. If swallowed and irritation or discomfort occurs, obtain medical attention.

## Over-exposure signs/symptoms

<b>Notes to physician:</b>	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
<b>Specific treatments:</b>	Not Applicable
<b>Protection of first-aiders:</b>	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.
<b>General information:</b>	Pre-existing medical conditions that may be aggravated by exposure include disorders of the eye, skin and lung (including asthma and other breathing disorders). If addicted to tobacco, smoking will impair the ability of the lungs to clear themselves of dust.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

<b>Suitable extinguishing media:</b>	Not combustible. Use extinguishing agent appropriate for surrounding flammable materials
<b>Unsuitable extinguishing media:</b>	None known.
<b>Specific hazards arising from the chemical:</b>	Not combustible. Nonflammable. Spalling of hardened concrete may occur under conditions of intense heat.
<b>Hazardous thermal decomposition Products:</b>	Material is not combustible.
<b>Special protective actions for fire-fighters:</b>	Material is nonflammable. Use appropriate procedures for surrounding flammable materials.
<b>Special protective equipment for fire-fighters:</b>	Use protective equipment appropriate for surrounding materials. No specific precautions.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

<b>For response personnel:</b>	Keep unprotected personnel out of the area. Do not dry sweep dusty material. All local and Federal laws governing waste disposal must be followed.
<b>Environmental precautions:</b>	Clean spilled material immediately. Contain spills and wash water to prevent run-off into public waterways. Remove wet concrete from roadways immediately. Do not dry sweep spilled dusty material.

### Methods and materials for containment and cleaning up

<b>Small spill:</b>	Alkali resistant gloves, long sleeves, long pants and safety glasses should be used by clean up personnel for wet concrete releases.
<b>Large spill:</b>	Waterproof boots and goggles should be used. Eye protection and appropriate respirator protection should be used to protect clean up personnel against dust.

## Section 7. Handling and storage

### Precautions for safe handling

<b>Protective measures:</b>	Use personnel protective equipment to avoid direct contact with concrete. Remove contaminated clothes as soon as possible. Dust may be generated during handling or mixing dry powder or from cutting, breaking or crushing hardened material. Use wet cutting methods when possible.
<b>Advice on general occupational hygiene:</b>	Observe good industrial hygiene practices. Promptly remove dusty clothing and launder before reuse.
<b>Conditions for safe storage, including any incompatibilities:</b>	Store away from moisture, acids, and other incompatible materials. Store and use material in such a way as to prevent release to drains or waterways.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
Particulates not otherwise classified (CAS SEQ250)	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 3 mg/m<sup>3</sup>. Form: Respirable particles TWA: 10 mg/m<sup>3</sup>. Form: Inhalable particles</p> <p><b>OSHA PEL (United States, 6/2010)</b> PEL: 5 mg/m<sup>3</sup>. Form: Respirable fraction PEL: 15 mg/m<sup>3</sup>. Form: Total dust TWA: 5 mg/m<sup>3</sup>. Form: Respirable fraction TWA: 15 mg/m<sup>3</sup>. Form: Total dust</p>
Portland Cement	<p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 3 mg/m<sup>3</sup>. Form: Respirable dust TWA: 10 mg/m<sup>3</sup>. Form: Total dust</p> <p><b>OSHA PEL (United States, 6/2010)</b> PEL: 5 mg/m<sup>3</sup>. Form: Respirable dust PEL: 15 mg/m<sup>3</sup>. Form: Total dust</p>
Crystalline Silica (Quartz) (CAS 14808-60-7)	<p><b>OSHA PEL (United States, 9/2017)</b> TWA: 0.3 mg/m<sup>3</sup>. Form: Total dust (1,2) TWA: 0.05 mg/m<sup>3</sup>. Form: Respirable (1,2,3)</p> <p><b>ACGIH TLV (United States, 3/2012)</b> TWA: 0.025 mg/m<sup>3</sup>. Form: Respirable fraction</p> <p><b>NIOSH REL (United States, 6/2009)</b> TWA: 0.05 mg/m<sup>3</sup>. Form: Respirable dust</p>

**Appropriate engineering controls:**

The use of ventilation or other engineering controls may be necessary to maintain airborne levels below any applicable limits. Under normal operations general ventilation should suffice.

**Environmental exposure controls:**

Use general ventilation, local exhaust and/or wet suppression methods to maintain exposures below allowable exposure limits.

**Exposure guidelines:**

OSHA PELs, MSHA PELs, and ACGIH TLVs are 8-hr TWA values. NIOSH RELs are for TWA exposures up to 10-hr/day and 40-hr/wk. Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled. Terms including "Particulates Not Otherwise Classified," "Particulates Not Otherwise Regulated," "Particulates Not Otherwise Specified," and "Inert or Nuisance Due" are often used interchangeably; however, the user should review each agency's terminology for differences in meanings.

### Individual protection measures

**Hygiene measures:**

Use good personal hygiene practices. Do not consume or store food in the work area. Wash hands thoroughly before eating, drinking, or smoking.

**Eye/face protection:**

Safety glasses with side shields should be worn as minimum protection from dust. Dust goggles or full face protection should be worn when very dusty conditions are present or are anticipated.

## Skin protection

<b>Hand protection:</b>	Use alkali resistant gloves to provide hand protection from concrete.
<b>Body protection:</b>	Clothing with long sleeves will provide protection. Waterproof boots high enough to prevent cement from entering should be worn when workers will be standing in wet concrete. Contaminated work clothing should be washed after use.
<b>Other skin protection:</b>	Clothing with long sleeves and long pants should be used to prevent contact with wet concrete.
<b>Respiratory protection:</b>	The need for respiratory protection should be evaluated by a qualified professional. The use of respirators for controlling exposures in excess of the PEL must comply with OSHA and MSHA requirements for medical surveillance, respiratory fit testing, repair and cleaning, and user training. In dusty areas, air monitoring for dust and quartz should be conducted regularly. Dust and quartz levels in excess of appropriate exposure limits should be reduced by all feasible engineering controls, including but not limited to, wet suppression, ventilation, process enclosure, and enclosed employee work stations.

## Section 9. Physical and chemical properties

### Appearance

<b>Physical State:</b>	Flowable, granular mud-like material	<b>Lower and Upper explosive flammable limits</b>	No test data available
<b>Color:</b>	Gray	<b>Vapor pressure:</b>	No test data available
<b>Odor:</b>	None	<b>Vapor density:</b>	Not applicable
<b>Odor threshold:</b>	Not applicable	<b>Relative density:</b>	1.5-3.0
<b>pH:</b>	12-13 in water	<b>Solubility:</b>	Not applicable
<b>Melting point:</b>	Not applicable	<b>Solubility in water:</b>	Negligible
<b>Boiling point:</b>	Not applicable	<b>Partition coefficient: n-octanol/water:</b>	Not applicable
<b>Flash point:</b>	Not applicable	<b>Auto-ignition temperature:</b>	No test data available
<b>Burning time:</b>	Not applicable	<b>Decomposition temperature:</b>	No test data available
<b>Burning rate:</b>	Not applicable	<b>SADT:</b>	Not applicable
<b>Evaporation Rate:</b>	Not applicable	<b>Viscosity:</b>	Not applicable
<b>Flammability (solid, gas):</b>	No		

## Section 10. Stability and reactivity

<b>Reactivity:</b>	Stable
<b>Chemical Stability:</b>	This material is considered stable under recommended handling and storage conditions.
<b>Possibility of hazardous reactions:</b>	Polymerization will not occur.
<b>Conditions to avoid:</b>	Keep dry until used. Avoid contact with incompatible compounds.
<b>Incompatible materials:</b>	Wet cement may react with acids, aluminum, ammonium salts, alkali and alkaline earth compounds.
<b>Hazardous decomposition products:</b>	None

## Section 11. Toxicological information

### Information on toxicological effects

<b>Acute toxicity:</b>	Not reported to be acutely toxic.
<b>Irritation/Corrosion:</b>	<b>Skin:</b> May cause skin burns or skin ulcers. <b>Eyes:</b> May cause eye irritation or serious eye damage. <b>Respiratory:</b> Studies indicate an increased risk of lung cancer from chronic exposure to respirable crystalline silica. This effect was more pronounced in those with silicosis. Studies have also linked crystalline silica exposure with autoimmune diseases and kidney disorders.
<b>Sensitization:</b>	May cause sensitization due to the potential presence of trace amounts of hexavalent chromium.
<b>Mutagenicity:</b>	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
<b>Carcinogenicity:</b>	See chart below.

Product/ingredient name	OSHA	IARC	ACGIH	NTP
Portland Cement	-	-	A4	-
Crystalline Silica (Quartz) CAS 14808-60-7	-	1	A2	Known to be a human carcinogen

**Reproductive toxicity:** Not expected to be a reproductive hazard.  
**Teratogenicity:** Not expected to be a teratogenic hazard.

**Specific target organ toxicity (single exposure)**

Name	Category	Route of Exposure	Target Organs
Crystalline Silica (Quartz) CAS 14808-60-7	-	Inhalation	Not reported to have effects

**Specific target organ toxicity (repeated exposure)**

Name	Category	Route of Exposure	Target Organs
Crystalline Silica (Quartz) CAS 14808-60-7	-	Inhalation	May cause damage to organs (lung) through prolonged or repeated exposure.

**Potential chronic health effects: General:** Prolonged inhalation of respirable crystalline silica may be harmful. May cause damage to organs (lungs) through prolonged or repeated exposure. There are reports in the literature suggesting that excessive crystalline silica exposure may be associated with autoimmune disorders and other adverse health effects involving the kidney. In particular, the incidence of scleroderma (thickening of the skin caused by swelling and the thickening of fibrous tissue) appears to be higher in silicotic individuals. To date, the evidence does not conclusively determine a causal relationship between silica exposure and these adverse health effects.

**Aspiration hazard:** Due to the physical form of the product it is not an aspiration hazard.

**Section 12. Ecological Information**

**Persistence and degradability:** No available data.  
**Bioaccumulative potential:** No available data.  
**Mobility in soil:** No available data.  
**Other adverse effects:** No known significant effects or critical hazards.

**Section 13. Disposal considerations**

**Disposal methods:** Dispose of waste product and unused product in compliance with federal, state and local requirements. Used material which has become contaminated, may have significantly different characteristics based on the contaminant and should be evaluated accordingly. The product may be contaminated during use and it is the responsibility of the user to assess the appropriate disposal method in that situation.

## Section 14. Transportation information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	-	-	-
Additional information	-	-	-

**Special precautions for user:** It is the responsibility of the transporting entity to follow all applicable laws, regulations, and rules regarding the transport of this material.

## Section 15. Regulatory Information

### U.S. Federal regulations:

<b>OSHA Hazard Communication Standard, 29 CFR 1910.1200</b>	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200
<b>TSCA Section 12(b) Export Notification (40 CFR 707, Subpart. D):</b>	Not regulated
<b>OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):</b>	Not listed
<b>CERCLA Hazardous Substance List (40 CFR 302.4):</b>	Not listed
<b>Clean Air Act Section 112 (b): Hazardous Air Pollutants (HAPs):</b>	Not regulated
<b>Clean Air Act Section 112 (r) Accidental Release Prevention (40 CFR 68.130):</b>	Not regulated
<b>Safe Drinking Water Act (SDWA):</b>	Not regulated

## SARA 311/312

### Composition/information on ingredients

Name	%	Fire Hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Crystalline Silica (Quartz)	>1	No	No	No	No	Yes

## SARA 313

	Product name	CAS number	%
Form R-Report requirements	Crystalline Silica (Quartz)	14808-60-7	Not regulated

## State regulations

Massachusetts RTK:	Listed
New Jersey RTK:	Listed
Pennsylvania RTK:	Listed
Rhode Island RTK:	Listed

## California Prop. 65

WARNING: This product contains crystalline silica and chemicals (trace metals) known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
Crystalline Silica (Quartz) CAS 14808-60-7	Yes	No	No	No

## International regulations

Ingredient name	CAS #	TSCA	Canada	WHMIS	EEC
Portland Cement	65997-15-1	Yes	DSL	D2A	EINECS
Water	7732-18-5	Yes	DSL	-	EINECS
Crystalline Silica (Quartz)	14808-60-7	Yes	DSL	-	EINECS

### WHMIS Classification:

D2A "Materials Causing Other Toxic Effects"



## Section 16. Other Information

**Date of issue:** 07/01/2018  
**Replaces:** 06/01/2015  
**Revised Section(s):** Section 8

### Notice to reader

While the information provided in this safety data sheet is believed to provide a useful summary of the hazards of ready mix concrete as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. In particular, the data furnished in this sheet do not address hazards that may be posed by other materials mixed with ready mix concrete to produce ready mix concrete products. Users should review other relevant material safety data sheets before working with this ready mix concrete or working on ready mix concrete products.

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## Abbreviations

ACGIH — American Conference of Governmental Industrial Hygienists  
CAS — Chemical Abstract Service  
CERCLA — Comprehensive Emergency Response and Comprehensive Liability Act  
CFR — Code of Federal Regulations  
DOT — Department of Transportation  
GHS — Globally Harmonized System  
HEPA — High Efficiency Particulate Air  
IATA — International Air Transport Association  
IARC — International Agency for Research on Cancer  
IMDG — International Maritime Dangerous Goods  
NIOSH — National Institute of Occupational Safety and Health  
NOEC — No Observed Effect Concentration  
NTP — National Toxicology Program  
OSHA — Occupational Safety and Health Administration  
PEL — Permissible Exposure Limit  
REL — Recommended Exposure Limit  
RQ — Reportable Quantity  
SARA — Superfund Amendments and Reauthorization Act  
SDS — Safety Data Sheet  
TLV — Threshold Limit Value  
TPQ — Threshold Planning Quantity  
TSCA — Toxic Substances Control Act  
TWA — Time-Weighted Average  
UN — United Nations

# SAFETY DATA SHEET

## Hydrochloric Acid, 31 – 36%

### SECTION 1

### PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** Hydrochloric Acid, 31 – 36.7%

**Identified Uses:** Acid etching, steel pickling, oil and gas, ore and mineral, food processing, pharmaceutical, organic chemical synthesis

**Company Information:**

ASHTA Chemicals Inc.

P.O. Box 858

Ashtabula, Ohio 44005

**Phone:** (440)997-5221

**Fax:** (440)998-0286

**24-hour Emergency Phone:** CHEMTREC: (800)424-9300

### SECTION 2

### HAZARDS IDENTIFICATION

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Corrosive to metals - Category 1 Serious eye damage - Category 1 Skin corrosion - Category 1B

Specific target organ toxicity - single exposure - Category 3

**GHS label elements, including precautionary statements:**

Signal Word: **Danger**

Pictograms(s):



**Hazard Statements**

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

**Precautionary Statements**

P234	Keep only in original container.
P261	Avoid breathing dust/fume/mist/vapors/spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water. Shower.

P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container with a resistant inner liner.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/container in accordance with local/state/national regulations.

### SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

**Synonyms:**

CHEMICAL NAME: Hydrochloric acid  
TRADE NAME: Hydrochloric acid, 31 –36%  
SYNONYMS: Muriatic acid, Chlorohydric acid, Hydrogen Chloride

C.A.S: 7647-01-0  
EC: 231-595-7  
WHMIS: D2A, E

CHEMICAL FORMULA: HCl (in aqueous solution)  
CHEMICAL FAMILY: Inorganic Acid

### SECTION 4 FIRST AID MEASURES

**Description of first aid measures:**

Consult a physician. Show this safety data sheet to the doctor in attendance.

**If inhaled:**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give humidified air. Give oxygen, but only by a certified physician. Consult a physician.

**In case of skin contact:**

Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact:**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Remove contact lenses if present and easy to do. Continue rinsing eyes during transport to medical facility.

**If swallowed:**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth thoroughly with water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Consult a physician.

NOTICE: The data and information in this bulletin are to the best of ASHTA Chemicals' knowledge complete, accurate and correct; however, no representations or warranties, written or oral, express or implied, are made by ASHTA Chemicals Inc., as to such data and information or that the goods mentioned herein are suitable for any particular purpose or merchantable, or that such goods are free from any patent infringement. Purchasers should satisfy themselves of the suitability of any such goods for the purpose intended prior to purchase. Rev. 11/03/2020

## SECTION 5

## FIRE FIGHTING MEASURES

Flash Point (Method):	Non-combustible.
Extinguishing Media:	Use extinguishing agents compatible with acid and appropriate for the burning material. Use water spray to keep fire-exposed containers cool.
Auto Ignition Temp:	Non-combustible.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and full protective clothing. In case of fire and/or explosion do not breathe fumes. Use standard fire fighting procedures and consider the hazards of other involved materials.
Unusual Fire/Explosion Hazards:	Releases flammable hydrogen gas when reacting with metals.

## SECTION 6

## ACCIDENTAL RELEASE MEASURES

### Environmental Precautions:

Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Avoid discharge into drains, water courses or onto the ground.

### Containment and Cleaning:

Follow preplanned emergency procedures. Only properly equipped, trained, functional personnel should attempt to contain a leak. All other personnel should be evacuated from the danger area. Using full protective equipment, apply appropriate emergency device or other securement technology to stop the leak if possible.

Small Spill:	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: neutralize the residue with a dilute solution of sodium carbonate.
Large Spill:	Corrosive liquid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to knock down vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that vapor is not present at a concentration level above TLV.

## SECTION 7

## HANDLING AND STORAGE

### Precautions to be taken for handling and storage:

Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Observe good industrial hygiene practices. Do not empty into drains. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes. Store in a well-ventilated place. Store away from incompatible materials. Store closed containers in a clean, cool, open or well-ventilated area. Keep out of sun.

**SECTION 8 EXPOSURE CONTROL/PERSONAL PROTECTION**

**Principal Component:** Hydrochloric Acid  
**Occupational Exposure Limits:**  
**Regulatory Limits:**

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrochloric Acid Mixture	---	---	5 ppm 7.59 mg/m <sup>3</sup>

ACGIH TLV = 5 ppm (7.59 mg/m<sup>3</sup>) TWA

NIOSH IDLH = 50 ppm (as HCl, 2010)

**Exposure Controls:**

**Eye Protection:** Tightly fitting safety goggles. Face shield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Respiratory Protection:** Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Other Protection:** Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Ventilation Recommended:** Exhaust ventilation is required to meet PEL limits.

**Glove Type Recommended:** Wear neoprene, nitrile, butyl rubber or PVC gloves to prevent exposure.

**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

Information on basic physical and chemical properties:

Appearance	Colorless to light yellow liquid
Odor	Pungent (irritating/strong)
Odor threshold	0.3ppm (can cause olfactory fatigue)
pH	<1 (in aqueous solution)
Melting point/freezing point	-30°C (-22°F)
Initial boiling point	>100°C (>212°F)
Flash point	Not applicable

NOTICE: The data and information in this bulletin are to the best of ASHTA Chemicals' knowledge complete, accurate and correct; however, no representations or warranties, written or oral, express or implied, are made by ASHTA Chemicals Inc., as to such data and information or that the goods mentioned herein are suitable for any particular purpose or merchantable, or that such goods are free from any patent infringement. Purchasers should satisfy themselves of the suitability of any such goods for the purpose intended prior to purchase. Rev. 11/03/2020

Auto-ignition temp	Not applicable
Evaporation rate	No data available
Decomposition temperature	No data available
Flammability (solid, gas)	Not combustible
Upper/lower flammability or explosive limits	Not combustible
Water solubility	100%
Molecular weight	36.46
Relative density (specific gravity)	1.16 (32% HCl solution) 1.19 (36.5% HCl solution)
Bulk density	8.75 lbs/gal (32% HCl solution) 9.83 lbs/gal (36.5% HCl solution)
Vapor density (air = 1)	1.267 at 20 °C
Vapor pressure	84 mm Hg @ 20°C
Partition coefficient: n-octanol/water	No data available

## SECTION 10

## STABILITY AND REACTIVITY

Stability:	Hydrochloric acid is stable under normal conditions and pressures.
Conditions to avoid:	Incompatible materials, metals, excess heat, bases.
Incompatibility:	Bases, amines, metals, permanganates (e.g., potassium permanganate), fluorine, metal acetylides, hexalithium disilicide.
Hazardous decomposition products:	Hydrogen chloride, chlorine, hydrogen gas.
Polymerization:	Hazardous polymerization WILL NOT occur.

## SECTION 11

## TOXICOLOGICAL INFORMATION

### Information on likely routes of exposure:

Inhalation:	Vapors and mist will irritate throat and respiratory system and cause coughing.
Skin contact:	Causes skin burns.
Eye contact:	Causes eye burns.
Ingestion:	Harmful if swallowed. Causes digestive tract burns. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.

### Symptoms related to the physical, chemical and toxicological characteristics:

Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

### Information on toxicological effects:

Acute toxicity:	Harmful if swallowed.
Skin corrosion/irritation:	Causes severe skin burns and eye damage.
Irritation:	Causes serious eye damage.

Respiratory sensitization:	Not available.
Skin sensitization:	No data available.
Germ cell mutagenicity:	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity:	This product is not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive toxicity:	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure:	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure:	No data available.
Aspiration hazard:	Not available.
Chronic effects:	Prolonged inhalation may be harmful.

**Components Species Test Results:**  
Hydrochloric acid (CAS# 7647-01-0)

Rat - Inhalation LC <sub>50</sub> :	3124 ppm, (1 hour)
Rabbit - Dermal LD <sub>50</sub> :	5010 mg/kg

**SECTION 12**

**ECOLOGICAL INFORMATION**

Ecotoxicity:	Because of the low pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.
Aquatic Toxicity:	This material is toxic to fish and aquatic organisms. Most aquatic species do not tolerate pH lower than 5.5 for any extended period.
Fish Toxicity:	Fish LC <sub>50</sub> Mosquito fish: 282 mg/l, 96 hours Fish LC <sub>50</sub> Bluegill: 3.6 mg/l, 48 hours
Persistence and Degradability:	Not biodegradable. Hydrochloric acid will likely be neutralized to chloride by alkalinity present in natural environment.
Bioaccumulative Potential:	No data available.
Mobility in Soil:	Hydrochloric acid will be neutralized by naturally occurring alkalinity. The acid will permeate soil, dissolving some soil material and will then neutralize.
Other Adverse Effects:	No other adverse environmental effects (e.g., ozone depletion, photochemical ozone creation).

**SECTION 13**

**DISPOSAL CONSIDERATIONS**

Collect and reclaim or dispose in sealed containers at a properly licensed waste disposal site. This material, if not neutralized, must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national or international regulations.

**SECTION 14**

**TRANSPORT INFORMATION**

**Shipping:**

Usual Shipping Containers:	Tank cars, bulk tankers.
Usual Shelf Life:	Indefinite (life of containers).
Storage/Transport Temperatures:	Ambient.

**Suitable Storage:**

Materials/Coatings: Teflon, Tygon, Rubber, PVC and Polypropylene Materials.

**D.O.T. Information:**

Labeling:	Corrosive
D.O.T. Identification Number:	UN 1789
D.O.T. Shipping Name:	Hydrochloric Acid
Hazard Class:	8
Packing Group:	II
Hazard Guide:	157
Placard:	UN 1789

**SECTION 15**

**REGULATORY INFORMATION**

**SARA 302 Components**

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:

Hydrochloric Acid	CAS#: 7647-01-0
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**SARA 311/312 Hazards**

Acute health hazard, reactive hazard.

**Massachusetts Right to Know Components**

Hydrochloric Acid	CAS#: 7647-01-0
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**Pennsylvania Right to Know Components**

Hydrochloric Acid	CAS#: 7647-01-0
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**New Jersey Right to Know Components**

Hydrochloric Acid	CAS#: 7647-01-0
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**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other reproductive harm.

**OSHA PSM/RMP Threshold for Accidental Release:**

CAS# 7647-01-0 is regulated under OSHA PSM *only* if anhydrous HCl.

CAS# 7647-01-0 is regulated under EPA RMP *only* if  $\geq 37\%$  HCl.

**Toxic Substances Control Act (TSCA):**

Hydrochloric Acid

CAS#: 7647-01-0

**Comprehensive Environmental Response Compensation Liability Act: (CERCLA)**

Hydrochloric Acid

CAS#: 7647-01-0

**SECTION 16**

**OTHER INFORMATION**

**NFPA Rating:**

Health hazard: 3

Fire Hazard: 0

Reactivity Hazard: 1

This information is drawn from recognized sources believed to be reliable. ASHTA Chemicals, Inc. makes no guarantees or assumes any liability in connection with this information. The user should be aware of changing technology, research, regulations and analytical procedures that may require changes herein. The above data is supplied upon the condition that persons will evaluate this information and then determine its suitability for their use. Only U.S.A. regulations apply to the above.

Version 1.0	For the new GHS SDS Standard	Revision Date: 12/31/2014
Version 1.1	Graphics updated	Revision Date: 3/9/2015
Version 1.2	Title updated	Revision Date: 6/2/2015
Version 1.3	Section 9 changes	Revision Date: 7/30/2015
Version 1.4	Section 1, 15 changes	Revision Date: 4/15/2016
Version 1.5	Changed P501 text (Section 2)	Revision Date: 6/15/2016
Version 1.6	Updated Section 2.0	Revision Date 4/20/2017
Removed Version, Updated Format		Revision Date 5/16/2018
Updated Format		Revision Date: 11/03/2020

### SECTION 1: Product and company identification

#### 1.1. Product identifier

Product form	: Substance
Name	: Helium, compressed
CAS No	: 7440-59-7
Formula	: He
Other means of identification	: Helium-4, refrigerant gas R-704, LaserStar Helium, Medipure Helium, UltraLift Helium, Helium - Diving Grade

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	: Industrial use Medical applications Diving Gas (Underwater Breathing)
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#### 1.3. Details of the supplier of the safety data sheet

Praxair, Inc.  
10 Riverview Drive  
Danbury, CT 06810-6268 - USA  
T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146  
[www.praxair.com](http://www.praxair.com)

#### 1.4. Emergency telephone number

Emergency number	: Onsite Emergency: 1-800-645-4633
	: CHEMTREC, 24hr/day 7days/week — Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887 (collect calls accepted, Contract 17729)

### SECTION 2: Hazard identification

#### 2.1. Classification of the substance or mixture

##### GHS-US classification

Compressed gas H280

#### 2.2. Label elements

##### GHS-US labeling

Hazard pictograms (GHS-US)	: 
	: GHS04
Signal word (GHS-US)	: WARNING
Hazard statements (GHS-US)	: H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION
Precautionary statements (GHS-US)	: P202 - Do not handle until all safety precautions have been read and understood P271 - Use and store only outdoors or in a well-ventilated area P403 - Use and store only outdoors or in a well-ventilated place CGA-PG05 - Use a back flow preventive device in the piping CGA-PG10 - Use only with equipment rated for cylinder pressure CGA-PG06 - Close valve after each use and when empty CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

#### 2.3. Other hazards

Other hazards not contributing to the	: Asphyxiant in high concentrations.
---------------------------------------	--------------------------------------

classification

### 2.4. Unknown acute toxicity (GHS US)

No data available

## SECTION 3: Composition/Information on ingredients

### 3.1. Substance

Name : Helium, compressed  
CAS No : 7440-59-7

Name	Product identifier	%
Helium	(CAS No) 7440-59-7	99.5 - 100

### 3.2. Mixture

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : Adverse effects not expected from this product.

First-aid measures after eye contact : Adverse effects not expected from this product. In case of eye irritation: Rinse immediately with plenty of water. Consult an ophthalmologist if irritation persists.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms and effects, both acute and delayed

No additional information available

### 4.3. Indication of any immediate medical attention and special treatment needed

None.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

### 5.2. Special hazards arising from the substance or mixture

No additional information available

### 5.3. Advice for firefighters

Firefighting instructions : Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Protection during firefighting : Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.

Special protective equipment for fire fighters : Use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems

Stop flow of product if safe to do so

Use water spray or fog to knock down fire fumes if possible.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate area. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. Stop leak if safe to do so.

# Helium, compressed

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This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

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### 6.1.1. For non-emergency personnel

No additional information available

### 6.1.2. For emergency responders

No additional information available

### 6.2. Environmental precautions

Try to stop release.

### 6.3. Methods and material for containment and cleaning up

No additional information available

### 6.4. Reference to other sections

See also sections 8 and 13.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Precautions for safe handling

: Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

Safe use of the product

: **The suitability of this product as a component in underwater breathing gas mixtures** is to be determined by or under the supervision of personnel experienced in the use of underwater breathing gas mixtures and familiar with the physiological effects, methods employed, frequency and duration of use, hazards, side effects, and precautions to be taken.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions

: Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods

**OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE:** When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

### 7.3. Specific end use(s)

None.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

Helium, compressed (7440-59-7)	
ACGIH	Not established
USA OSHA	Not established
Helium (7440-59-7)	
ACGIH	Not established
USA OSHA	Not established

# Helium, compressed

## Safety Data Sheet P-4602

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### 8.2. Exposure controls

Appropriate engineering controls	: Use a local exhaust system with sufficient flow velocity to maintain an adequate supply of air in the worker's breathing zone. Mechanical (general): General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.
Eye protection	: Wear safety glasses with side shields.
Skin and body protection	: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.
Respiratory protection	: When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Colorless gas.
Molecular mass	: 4 g/mol
Color	: Colorless.
Odor	: Odorless.
Odor threshold	: No data available
pH	: Not applicable.
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -272 °C
Freezing point	: No data available
Boiling point	: -268.93 °C
Flash point	: No data available
Critical temperature	: -268 °C
Auto-ignition temperature	: Not applicable.
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor pressure	: Not applicable.
Critical pressure	: 230 kPa
Relative vapor density at 20 °C	: No data available
Relative density	: No data available
Density	: 0.166 kg/m <sup>3</sup>
Relative gas density	: 0.14
Solubility	: Water: 1.5 mg/l
Log Pow	: Not applicable.
Log Kow	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.
Oxidizing properties	: None.
Explosion limits	: No data available

### 9.2. Other information

Gas group	: Compressed gas
Additional information	: None

### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

No additional information available

#### 10.2. Chemical stability

Stable under normal conditions.

#### 10.3. Possibility of hazardous reactions

None.

#### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

#### 10.5. Incompatible materials

None.

#### 10.6. Hazardous decomposition products

None.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Acute toxicity	: Not classified
Skin corrosion/irritation	: Not classified pH: Not applicable.
Serious eye damage/irritation	: Not classified pH: Not applicable.
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified

### SECTION 12: Ecological information

#### 12.1. Toxicity

Ecology - general : No ecological damage caused by this product.

#### 12.2. Persistence and degradability

##### Helium, compressed (7440-59-7)

Persistence and degradability	No ecological damage caused by this product.
-------------------------------	--

##### Helium (7440-59-7)

Persistence and degradability	No ecological damage caused by this product.
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#### 12.3. Bioaccumulative potential

##### Helium, compressed (7440-59-7)

Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

##### Helium (7440-59-7)

Log Pow	Not applicable for inorganic gases.
Log Kow	Not applicable.

# Helium, compressed

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Helium (7440-59-7)	
Bioaccumulative potential	No ecological damage caused by this product.

### 12.4. Mobility in soil

Helium, compressed (7440-59-7)	
Mobility in soil	No data available.
Ecology - soil	No ecological damage caused by this product.

Helium (7440-59-7)	
Mobility in soil	No data available.
Ecology - soil	No ecological damage caused by this product.

### 12.5. Other adverse effects

Effect on ozone layer : None

Effect on the global warming : None

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste disposal recommendations : Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

## SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1046 Helium, compressed, 2.2  
 UN-No.(DOT) : UN1046  
 Proper Shipping Name (DOT) : Helium, compressed  
 Class (DOT) : 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115  
 Hazard labels (DOT) : 2.2 - Non-flammable gas



### Additional information

Emergency Response Guide (ERG) Number : 120 (UN1963);121 (UN1046)  
 Other information : No supplementary information available.  
 Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:  
 - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

### Transport by sea

UN-No. (IMDG) : 1046  
 Proper Shipping Name (IMDG) : HELIUM, COMPRESSED  
 Class (IMDG) : 2 - Gases  
 MFAG-No : 121

### Air transport

UN-No. (IATA) : 1046  
 Proper Shipping Name (IATA) : Helium, compressed  
 Class (IATA) : 2  
 Civil Aeronautics Law : Gases under pressure/Gases nonflammable nontoxic under pressure

# Helium, compressed

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### SECTION 15: Regulatory information

#### 15.1. US Federal regulations

##### Helium, compressed (7440-59-7)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

SARA Section 311/312 Hazard Classes	Sudden release of pressure hazard
-------------------------------------	-----------------------------------

All components of this product are listed on the Toxic Substances Control Act (TSCA) inventory.

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

#### 15.2. International regulations

##### CANADA

##### Helium, compressed (7440-59-7)

Listed on the Canadian DSL (Domestic Substances List)

##### Helium (7440-59-7)

Listed on the Canadian DSL (Domestic Substances List)

#### EU-Regulations

##### Helium, compressed (7440-59-7)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

#### 15.2.2. National regulations

##### Helium, compressed (7440-59-7)

Listed on the AICS (Australian Inventory of Chemical Substances)  
 Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
 Listed on the Korean ECL (Existing Chemicals List)  
 Listed on NZIoC (New Zealand Inventory of Chemicals)  
 Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)  
 Listed on INSQ (Mexican National Inventory of Chemical Substances)

#### 15.3. US State regulations

##### Helium, compressed(7440-59-7)

U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

##### Helium (7440-59-7)

U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	Non-significant risk level (NSRL)
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# Helium, compressed

## Safety Data Sheet P-4602

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Helium (7440-59-7)				
No	No	No	No	

Helium (7440-59-7)
U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

### SECTION 16: Other information

Other information : When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product

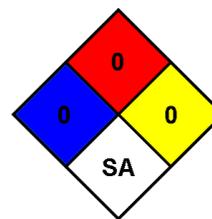
Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product

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PRAXAIR and the Flowing Airstream design are trademarks or registered trademarks of Praxair Technology, Inc. in the United States and/or other countries.

- NFPA health hazard : 0 - Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.
- NFPA fire hazard : 0 - Materials that will not burn.
- NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.
- NFPA specific hazard : SA - This denotes gases which are simple asphyxiants.



#### HMIS III Rating

- Health : 0 Minimal Hazard - No significant risk to health
- Flammability : 0 Minimal Hazard
- Physical : 3 Serious Hazard

SDS US (GHS HazCom 2012) - Praxair

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*

### 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Nitric acid

Product Number : 438073  
Brand : Sigma-Aldrich

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832  
Fax : +1 800-325-5052  
Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

### 2. HAZARDS IDENTIFICATION

#### Emergency Overview

##### OSHA Hazards

Target Organ Effect, Corrosive, Oxidizer

Target Organ Effect, Corrosive

##### Target Organs

Lungs, Teeth., Cardiovascular system.

##### GHS Classification

Oxidizing liquids (Category 3)  
Skin corrosion (Category 1A)  
Serious eye damage (Category 1)

##### GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H272

May intensify fire; oxidiser.

H314

Causes severe skin burns and eye damage.

Precautionary statement(s)

P220

Keep/Store away from clothing/ combustible materials.

P280

Wear protective gloves/ protective clothing/ eye protection/ face protection.

P305 + P351 + P338

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310

Immediately call a POISON CENTER or doctor/ physician.

##### HMIS Classification

Health hazard:

3

Chronic Health Hazard:

\*

**Flammability:** 0  
**Physical hazards:** 3

**NFPA Rating**

**Health hazard:** 3  
**Fire:** 0  
**Reactivity Hazard:** 2  
**Special hazard.:** OX

**Health hazard:** 3  
**Fire:** 0  
**Reactivity Hazard:** 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.  
**Skin** May be harmful if absorbed through skin. Causes skin burns.  
**Eyes** Causes eye burns. Causes severe eye burns.  
**Ingestion** May be harmful if swallowed.

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Formula :  $\text{HNO}_3$   
Molecular Weight : 63.01 g/mol

Component	Classification	Concentration
<b>Nitric acid</b>		
CAS-No. 7697-37-2	Ox. Liq. 3; Skin Corr. 1A; H272, H314	70 - 90 %
EC-No. 231-714-2		
Index-No. 007-004-00-1		

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

---

**4. FIRST AID MEASURES**

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Continue rinsing eyes during transport to hospital. Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

**5. FIREFIGHTING MEASURES**

**Conditions of flammability**

Not flammable or combustible.

**Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - nitrogen oxides (NOx)

**Further information**

Use water spray to cool unopened containers.

**6. ACCIDENTAL RELEASE MEASURES****Personal precautions**

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

**Environmental precautions**

Do not let product enter drains.

**Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Keep away from heat and sources of ignition.

**Conditions for safe storage**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Basis
Nitric acid	7697-37-2	TWA	2 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye & Upper Respiratory Tract irritation Dental erosion			
		STEL	4 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Eye & Upper Respiratory Tract irritation Dental erosion			
		TWA	2 ppm 5 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	4 ppm 10 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	2 ppm 5 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m <sup>3</sup> is approximate.			
		TWA	2 ppm 5 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		ST	4 ppm 10 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits

**Personal protective equipment****Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	liquid
Colour	colourless

**Safety data**

pH	< 1.0
Melting point/freezing point	no data available
Boiling point	120.5 °C (248.9 °F) - lit.
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	49 hPa (37 mmHg) at 50 °C (122 °F)
Density	1.413 g/cm <sup>3</sup> at 20 °C (68 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

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**10. STABILITY AND REACTIVITY****Chemical stability**

Stable under recommended storage conditions.

**Possibility of hazardous reactions**

no data available

**Conditions to avoid**

no data available

**Materials to avoid**

Alkali metals, Organic materials, Acetic anhydride, Acetonitrile, Alcohols, Acrylonitrile, Ammonia, Crotonaldehyde, Halogenated hydrocarbon, Acids, Bases, Metals, hexalithium disilicide, Hydrogen peroxide, Ketones, metal acetylides, Water, Fluorine, Amines, Thiols, cadmium, Bromine, Copper, Hydrazine, Hydrazinium nitrate, Nitro compounds, Cyanides, Phosphorus trihydride (phosphine), Diphosphine, Halides, Organic halides, May set fire to wood or paper., Polyethers, Methyl vinyl ether

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - nitrogen oxides (NOx)  
Other decomposition products - no data available

---

**11. TOXICOLOGICAL INFORMATION****Acute toxicity****Oral LD50**

no data available

**Inhalation LC50****Dermal LD50**

no data available

**Other information on acute toxicity**

no data available

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

Eyes: no data available

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin burns.
<b>Eyes</b>	Causes eye burns. Causes severe eye burns.

**Signs and Symptoms of Exposure**

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Inhalation may provoke the following symptoms:, spasm, inflammation and edema of the bronchi, spasm, inflammation and edema of the larynx, pneumonitis, pulmonary edema, Symptoms and signs of poisoning are:, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Pulmonary edema. Effects may be delayed., Large doses may cause: conversion of hemoglobin to methemoglobin, producing cyanosis; marked fall in blood pressure, leading to collapse, coma, and possibly death.

**Synergistic effects**

no data available

**Additional Information**

RTECS: Not available

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**12. ECOLOGICAL INFORMATION****Toxicity**

no data available

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

no data available

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**13. DISPOSAL CONSIDERATIONS****Product**

Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 2031 Class: 8 (5.1) Packing group: II  
Proper shipping name: Nitric acid  
Reportable Quantity (RQ): 1429 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN number: 2031 Class: 8 (5.1) Packing group: II EMS-No: F-A, S-Q

Proper shipping name: NITRIC ACID  
Marine pollutant: No

**IATA**

UN number: 2031 Class: 8 (5.1) Packing group: II  
Proper shipping name: Nitric acid  
IATA Passenger: Not permitted for transport

---

**15. REGULATORY INFORMATION**

**OSHA Hazards**

Target Organ Effect, Corrosive, Oxidizer Target Organ Effect, Corrosive

**SARA 302 Components**

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Nitric acid	7697-37-2	2007-07-01

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Nitric acid	7697-37-2	2007-07-01

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Nitric acid	7697-37-2	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Water	7732-18-5	
Nitric acid	7697-37-2	2007-07-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Water	7732-18-5	
Nitric acid	7697-37-2	2007-07-01

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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**16. OTHER INFORMATION**

**Text of H-code(s) and R-phrase(s) mentioned in Section 3**

H272	May intensify fire; oxidiser.
H314	Causes severe skin burns and eye damage.
Ox. Liq.	Oxidizing liquids
Skin Corr.	Skin corrosion

**Further information**

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### SECTION: 1. Product and company identification

#### 1.1. Product identifier

Product form : Substance  
Substance name : Isobutylene  
Chemical name : 2-methylpropene  
CAS-No. : 115-11-7  
Formula : C<sub>4</sub>H<sub>8</sub> / CH<sub>2</sub>=C(CH<sub>3</sub>)<sub>2</sub>  
Other means of identification : Isobutene, 2-methylpropene

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Industrial use; Use as directed.

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

Praxair, Inc.  
10 Riverview Drive  
Danbury, CT 06810-6268 - USA  
T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146  
[www.praxair.com](http://www.praxair.com)

#### 1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week  
— Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887  
(collect calls accepted, Contract 17729)

### SECTION 2: Hazard identification

#### 2.1. Classification of the substance or mixture

##### GHS US classification

Simple asphyxiant SIAS  
Flam. Gas 1 H220  
Press. Gas (Liq.) H280

#### 2.2. Label elements

##### GHS US labeling

Hazard pictograms (GHS US) :



Signal word (GHS US) :

Danger

Hazard statements (GHS US) :

H220 - EXTREMELY FLAMMABLE GAS  
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED  
OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION.  
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR  
CGA-HG01 - MAY CAUSE FROSTBITE.

Precautionary statements (GHS US) :

P202 - Do not handle until all safety precautions have been read and understood.  
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Heat, Open flames, Sparks, Hot surfaces  
P271+P403 - Use and store only outdoors or in a well-ventilated place.  
P280 - Wear protective gloves/protective clothing/eye protection/face protection.  
P377 - LEAKING GAS FIRE: Do not extinguish, unless leak can be stopped safely.



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P381 - Eliminate all ignition sources if safe to do so.  
 CGA-PG05 - Use a back flow preventive device in the piping.  
 CGA-PG12 - Do not open valve until connected to equipment prepared for use.  
 CGA-PG06 - Close valve after each use and when empty.  
 CGA-PG10 - Use only with equipment rated for cylinder pressure.  
 CGA-PG11 - Never put cylinders into unventilated areas of passenger vehicles.  
 CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).  
 P304 - IF INHALED:  
 P340 - Remove person to fresh air and keep comfortable for breathing.  
 P313 - Get medical advice/attention.  
 P302 - IF ON SKIN:  
 P336 - Thaw frosted parts with lukewarm water. Do not rub affected area.  
 P315 - Get immediate medical advice/attention.

### 2.3. Other hazards

Other hazards which do not result in classification : None.

### 2.4. Unknown acute toxicity (GHS US)

No data available

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Name	Product identifier	%
Isobutylene (Main constituent)	(CAS-No.) 115-11-7	100

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

### 4.2. Most important symptoms and effects, both acute and delayed

No additional information available

### 4.3. Indication of any immediate medical attention and special treatment needed

None.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media : Carbon dioxide, Dry chemical, Water spray or fog.



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### 5.2. Special hazards arising from the substance or mixture

- Fire hazard : EXTREMELY FLAMMABLE GAS. If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.
- Explosion hazard : EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents.
- Reactivity : No reactivity hazard other than the effects described in sub-sections below.

### 5.3. Advice for firefighters

- Firefighting instructions : **Danger: FLAMMABLE LIQUID AND VAPOR.** Evacuate all personnel from danger area. Use self-contained breathing apparatus. Immediately cool surrounding containers with water spray from maximum distance, taking care not to extinguish flames. Avoid spreading burning liquid with water. Remove ignition sources if safe to do so. If flames are accidentally extinguished, explosive reignition may occur. Reduce vapors with fine water spray or fog. Stop flow of liquid if safe to do so, while continuing cooling water spray. Remove all containers from area of fire if safe to do so. Allow fire to burn out. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1919 Subpart L - Fire Protection.
- Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
- Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

- General measures : **Danger: Flammable, liquefied gas.** FORMS EXPLOSIVE MIXTURES WITH AIR. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

#### 6.1.1. For non-emergency personnel

No additional information available

#### 6.1.2. For emergency responders

No additional information available

### 6.2. Environmental precautions

Try to stop release. Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

### 6.3. Methods and material for containment and cleaning up

No additional information available

### 6.4. Reference to other sections

See also sections 8 and 13.



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### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Precautions for safe handling : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

#### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g. NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

**OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE:** When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

#### 7.3. Specific end use(s)

None.

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

Isobutylene (115-11-7)		
ACGIH	ACGIH OEL TWA [ppm]	250 ppm

#### 8.2. Exposure controls

Appropriate engineering controls : Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. **MECHANICAL (GENERAL): Inadequate - Use only in a closed system.** Use explosion proof equipment and lighting.

Eye protection : Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection : Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.



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- Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
- Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

- Physical state : Gas
- Molecular mass : 56 g/mol
- Color : Colorless.
- Odor : Poor warning properties at low concentrations. Sweetish.
- Odor threshold : Odor threshold is subjective and inadequate to warn for overexposure.
- pH : Not applicable.
- Relative evaporation rate (butyl acetate=1) : No data available
- Relative evaporation rate (ether=1) : Not applicable.
- Melting point : -140.3 °C
- Freezing point : No data available
- Boiling point : -6.9 °C
- Flash point : -80 °C (closed cup)
- Critical temperature : 144.7 °C
- Auto-ignition temperature : 465 °C
- Decomposition temperature : No data available
- Flammability (solid, gas) : 1.8 – 8.8 vol %
- Vapor pressure : 260 kPa
- Critical pressure : 4000 kPa
- Relative vapor density at 20 °C : No data available
- Relative density : 0.63
- Density : 0.599 g/cm<sup>3</sup> (at 20 °C)
- Relative gas density : 2
- Solubility : Water: 388 mg/l
- Partition coefficient n-octanol/water (Log Pow) : 2.35
- Partition coefficient n-octanol/water (Log Kow) : Not applicable.
- Viscosity, kinematic : Not applicable.
- Viscosity, dynamic : Not applicable.
- Explosive properties : Not applicable.
- Oxidizing properties : None.
- Explosion limits : No data available

### 9.2. Other information

- Gas group : Press. Gas (Liq.)
- Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.



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### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

May occur.

### 10.4. Conditions to avoid

High temperature. Catalyst.

### 10.5. Incompatible materials

Halogens. Oxidizing agents. Acids.

### 10.6. Hazardous decomposition products

Thermal decomposition may produce : Carbon monoxide. Carbon dioxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity : Not classified

Isobutylene ( f )115-11-7	
LC50 Inhalation - Rat	620 mg/l/4h
LC50 Inhalation - Rat [ppm]	541657 ppm/1h
ATE US (gases)	270828.5 ppmV/4h
ATE US (vapors)	620 mg/l/4h
ATE US (dust, mist)	620 mg/l/4h

Skin corrosion/irritation : Not classified  
 pH: Not applicable.

Serious eye damage/irritation : Not classified  
 pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Isobutylene (115-11-7)	
National Toxicology Program (NTP) Status	1 - Evidence of Carcinogenicity

Reproductive toxicity : Not classified

STOT-single exposure : Not classified

STOT-repeated exposure : Not classified

Aspiration hazard : Not classified

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general : No known ecological damage caused by this product.

### 12.2. Persistence and degradability

Isobutylene (115-11-7)	
Persistence and degradability	The substance is biodegradable. Unlikely to persist.

### 12.3. Bioaccumulative potential

Isobutylene (115-11-7)	
Partition coefficient n-octanol/water (Log Pow)	2.35
Partition coefficient n-octanol/water (Log Kow)	Not applicable.

## Safety Data Sheet P-4614

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.  
Issue date: 01/01/1979    Revision date: 01/22/2021    Supersedes: 01/17/2019    Version: 1.0

### Isobutylene (115-11-7)

Bioaccumulative potential : Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9.

#### 12.4. Mobility in soil

### Isobutylene (115-11-7)

Mobility in soil : No data available.

Ecology - soil : Because of its high volatility, the product is unlikely to cause ground or water pollution.

#### 12.5. Other adverse effects

Effect on ozone layer : None.

Effect on the global warming : No known effects from this product.

## SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

## SECTION 14: Transport information

In accordance with DOT

Transport document description (DOT) : UN1055 Isobutylene, 2.1

UN-No.(DOT) : UN1055

Proper Shipping Name (DOT) : Isobutylene

Class (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115

Hazard labels (DOT) : 2.1 - Flammable gas



DOT Special Provisions (49 CFR 172.102) : 19 - For domestic transportation only, the identification number UN1075 may be used in place of the identification number specified in column (4) of the 172.101 table. The identification number used must be consistent on package markings, shipping papers and emergency response information.  
T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter.

#### Additional information

Emergency Response Guide (ERG) Number : 115 (UN1055)

Other information : No supplementary information available.

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:  
- Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

#### Transport by sea

UN-No. (IMDG) : 1055

Proper Shipping Name (IMDG) : ISOBUTYLENE

Class (IMDG) : 2 - Gases

Division (IMDG) : 2.1 - Flammable gases

MFAG-No : 115



# Isobutylene



## Safety Data Sheet P-4614

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### Air transport

UN-No. (IATA) : 1055  
 Proper Shipping Name (IATA) : Isobutylene  
 Class (IATA) : 2  
 Civil Aeronautics Law : Gases under pressure/Gases flammable under pressure

## SECTION 15: Regulatory information

### 15.1. US Federal regulations

#### Isobutylene (115-11-7)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

All components of this product are listed on the Toxic Substances Control Act (TSCA) inventory.

### 15.2. International regulations

#### CANADA

#### Isobutylene (115-11-7)

Listed on the Canadian DSL (Domestic Substances List)

### EU-Regulations

#### Isobutylene (115-11-7)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

### 15.2.2. National regulations

#### Isobutylene (115-11-7)

Listed on the AICS (Australian Inventory of Chemical Substances)  
 Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)  
 Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory  
 Listed on the Japanese ISHL (Industrial Safety and Health Law)  
 Listed on KECL/KECI (Korean Existing Chemicals Inventory)  
 Listed on NZIoC (New Zealand Inventory of Chemicals)  
 Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)  
 Listed on INSQ (Mexican National Inventory of Chemical Substances)  
 Listed on the TCSI (Taiwan Chemical Substance Inventory)

### 15.3. US State regulations

#### Isobutylene(115-11-7)

U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List



# Isobutylene



## Safety Data Sheet P-4614

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.  
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### SECTION 16: Other information

#### Other information

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Linde asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Linde Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Linde Inc, it is the user's obligation to determine the conditions of safe use of the product.

Linde SDSs are furnished on sale or delivery by Linde or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your sales representative, local distributor, or supplier, or download from [www.lindeus.com](http://www.lindeus.com). If you have questions regarding Linde SDSs, would like the document number and date of the latest SDS, or would like the names of the Linde suppliers in your area, phone or write the Linde Call Center (Phone: 1-800-772-9247; Address: Linde Call Center, Linde Inc, P.O. Box 44, Tonawanda, NY 14151-0044).

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#### Revision date

: 01/22/2021

#### NFPA health hazard

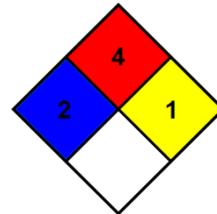
: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

#### NFPA fire hazard

: 4 - Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and burn readily.

#### NFPA instability

: 1 - Materials that in themselves are normally stable but can become unstable at elevated temperatures and pressures.



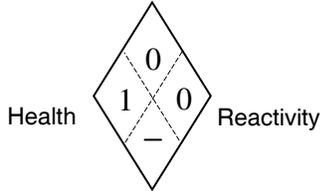
SDS US GHS DUAL BRANDED LINDE->PRAXAIR

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*

Approved: April 4, 2012

### NFPA

Flammability



0 = Minimal Hazard  
4 = Severe Hazard

### MATERIAL SAFETY DATA SHEET\* (MSDS)

International Products Corporation



CONCENTRATED CLEANING SOLUTION

### HMIS

Health – 1  
Flammability – 0  
Physical Hazards – 0  
Personal Protection – B

0 = Minimal Hazard  
4 = Severe Hazard  
B = Safety Glasses & Gloves

#### 1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME.....MICRO-90®  
CHEMICAL FAMILY.....Mixture  
CHEMICAL USE.....Concentrated Cleaning Solution  
ISSUE DATE OF MSDS.....April 4, 2012

<b>MANUFACTURER:</b>	<b>EMERGENCY TELEPHONES:</b>
International Products Corporation 201 Connecticut Drive Burlington, NJ 08016, USA Tel: (609) 386-8770 Fax: (609) 386-8438 mkt@ipcol.com	Transportation: CHEMTREC (800) 424-9300 (Calls within USA & Canada)  (703) 527-3887 (Calls from outside the USA)

<b>UK BRANCH:</b>	<b>Non-transportation:</b>
Unit 5, Green Lane Bus. Park 238 Green Lane London, SE9 3TL, United Kingdom Tel: 020 – 8857-5678 Fax: 020 – 8857-1313 saleseurope@ipcol.com	Tel: (609) 386-8770 Fax: (609) 386-8438

#### 4. FIRST AID MEASURES

**EYE CONTACT**.....Immediately flush eyes with plenty of water. Get medical attention if irritation develops or persists.  
**SKIN CONTACT**.....Remove contaminated clothing. Wash skin with soap and water. Get medical attention if irritation develops or persists.  
**INHALATION**.....If exposed to excessive levels of fumes, remove to fresh air and get medical attention if cough or other symptoms develop.  
**INGESTION**.....No specific treatment is necessary since this material is unlikely to be hazardous by ingestion. Call physician if pain or discomfort develops.

#### 2. COMPOSITION / INFORMATION ON INGREDIENTS

Contains water, builders, and surfactants.

This MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of the product.

#### 5. FIRE FIGHTING MEASURES

Nonflammable aqueous cleaner.  
**FLASH POINT**.....None.  
**LFL**.....Not applicable.  
**UFL**.....Not applicable.  
**EXTINGUISHING MEDIA**.....Use alcohol foam, carbon dioxide, or water spray to extinguish flames.  
**FIRE FIGHTING INSTRUCTION**.....As in any fire, wear self-contained breathing apparatus, pressure-demand MSHA/NIOSH (approved or equivalent) and full protective gear. Water runoff may cause environmental damage. Dike and collect water used to fight fire.

#### 3. HAZARDS IDENTIFICATION

\*\*\*\*\*

##### EMERGENCY OVERVIEW

Pale yellow aqueous solution with a slight ammonia odor.  
Nonflammable aqueous solution. NFPA rating of zero.  
No immediate hazards associated with the product.

\*\*\*\*\*

##### POTENTIAL HEALTH EFFECTS

**EYE CONTACT**..... Prolonged or repeated contact may cause irritation.  
**SKIN CONTACT**..... Prolonged or repeated contact may cause irritation.  
**INHALATION**..... Prolonged or repeated contact may cause irritation.  
**INGESTION**..... No hazard in normal industrial use.

##### CARCINOGENICITY:

**NTP**..... No ingredients are listed.  
**IARC**..... No ingredients are listed.  
**OSHA**..... No ingredients are listed.

**CHRONIC EFFECTS** . Not determined.

**TARGET ORGANS**.... Not determined.

**SIGNS AND SYMPTOMS**..... Eye and skin irritation (redness or swelling)

\*\*\*\*\*

##### POTENTIAL ENVIRONMENTAL EFFECTS

None known.

#### 6. ACCIDENTAL RELEASE MEASURES

Clean up spills immediately, observing precautions in Section 8 Personal Protection. Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container.

#### 7. HANDLING AND STORAGE

**HANDLING**..... Avoid contact with eyes, skin and clothing. Use in a well-ventilated area.  
**STORAGE**..... Store in a cool place in original container and protect from sunlight. Keep container closed when not in use. Use only stainless steel, polyethylene or plastic-lined containers for handling. Do not store in contact with aluminum, zinc, copper or their alloys.  
**SHELF LIFE**..... Five years from date of manufacture when stored in original sealed container at recommended storage temperature range.  
**STORAGE TEMPERATURE**..... 5–43°C (41–110°F)

\*ANSI Z400.1-1998 format

## 8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

**ENGINEERING CONTROLS**..... Good general ventilation should be sufficient to control airborne levels.

**RESPIRATORY PROTECTION** .....For most situations, no respiratory protection should be needed.

**SKIN PROTECTION** .....Wear nitrile or neoprene gloves.

**EYE PROTECTION** .....Wear safety glasses with side shields (or goggles). Contact lenses should not be worn.

**GENERAL HYGIENE CONSIDERATIONS** ..... There are no known health hazards associated with this material when used as recommended. The following general hygiene considerations are recognized as common, good industrial hygiene practices:

- Wash hands after use and before eating.
- Avoid breathing vapors.
- Wear safety glasses and gloves.

\* \* \* \* \*

**EXPOSURE LIMITS** ..... Not established for product as whole.

Ingredients	CAS #	ACGIH
None established for individual components.		

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE** ..... Clear, colorless to pale yellow solution.

**ODOR**.....Ammonia odor.

**pH (neat)**.....ca. 9.5

**BOILING POINT** .....ca. 100°C (212°F)

**FREEZING POINT** .....ca. -8°C (18°F)

**SOLUBILITY IN WATER** .....Complete

**SPECIFIC GRAVITY (water = 1)**.....1.135@25°C

## 10. STABILITY AND REACTIVITY

**STABILITY** ..... Stable liquid.

**HAZARDOUS POLYMERIZATION**..... Will not occur.

**INCOMPATIBILITIES** ..... May etch aluminum, zinc, copper, and its alloys. May craze acrylic and polycarbonate if not wiped or rinsed off. Do not mix with other cleaners. Mixing with chlorine-based cleaners may produce toxic gases.

**DECOMPOSITION PRODUCTS** ..... Not determined.

## 11. TOXICOLOGICAL INFORMATION

Eye: Irritant per USA-FHSA criteria.  
Not an Irritant per OECD Guideline No. 405.

Skin: Not an irritant per USA-FHSA criteria.  
Not an irritant per OECD Guideline No. 404.

Oral: LD<sub>50</sub> is greater than 5g/kg (rats).

## 12. ECOLOGICAL INFORMATION

Contains no CFCs, ODCs, phosphates, silicates, borates, halogens, or phenols.

## 13. DISPOSAL CONSIDERATIONS

MICRO-90® Concentrated Cleaning Solution is not considered a hazardous waste under Federal Hazardous Waste Regulations 40 CFR 261. Please be advised, however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

(Note: Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate.)

## 14. TRANSPORTATION INFORMATION

### A. USA

**D.O.T. SHIPPING** ..... Not regulated.

**TECHNICAL SHIPPING NAME** ..... Liquid Detergent

**D.O.T. LABEL** ..... None.

**D.O.T. PLACARD (non-bulk)** ..... None.

**FREIGHT CLASS PACKAGE** ..... Class 55 — Liquid detergent

**PRODUCT LABEL** ..... Concentrated Cleaning Solution

**B. CANADA: TDG** ..... Not regulated.

### C. ENGLAND: APPROVED

**CARRIAGE LIST** ..... Not regulated.

## 15. REGULATORY INFORMATION

### A. USA

**TSCA STATUS** ..... All ingredients are listed on the TSCA inventory.

**SARA TITLE III, 302/303 EHS** ..... None.

**SARA TITLE III, 304, HS** ..... None.

**SARA TITLE III, 313** ..... None.

### B. CANADA

**DSL** ..... All ingredients are listed on the Domestic Substance List.

**WHMIS Classification**..... Not controlled.

### C. EC

**EINECS** ..... All ingredients are listed.

**RoHS Directive** ..... MICRO-90® does not contain any ingredients listed in 2002/95/EC.

**REACH Directive**..... All ingredients comply with EC 1907/2006.

### D. CHIPS

..... Not a significant eye irritant.

..... Not a skin irritant.

All ingredients are also listed on the following inventories: Australia (AICS), Korea (ECL), Japan (ENCS), China (EICS), and Philippines (PICCS).

## 16. STATE REGULATORY INFORMATION

For details on specific requirements, you should contact the appropriate agency in your state.

## 17. OTHER INFORMATION

**PREPARED BY** .....K. Wyrofsky,  
President

**APPROVED BY** .....T. McGuckin,  
V.P. of Research, Quality & Safety

**APPROVAL DATE** .....April 4, 2012

**NOTE: All data presented here are for the full-strength product, unless otherwise noted. However, recommended usage is as a 1-2% w/w solution in water.**

**While International Products Corporation believes the information contained herein to be true and accurate, it has relied on information provided by others. International Products Corporation makes no warranties, express or implied, as to the accuracy or adequacy of the information contained herein or with respect to the results to be obtained from the use of the product. International Products Corporation disclaims all liability with respect to the use of this product, including without limitation, liability for injury to the user or third-party persons.**

# Safety Data Sheet

## Aerosol ALL Purpose Spray Paint

SDS Revision Date:

10/16/19

Rev. 4

### 1. Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

**Product Identity**

Aerosol ALL Purpose Spray Paint

**Alternate Names**

Aerosol ALL Purpose Spray Paint

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Intended use**

See Technical Data Sheet.

**Application Method**

See Technical Data Sheet.

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

**Company Name**

Harris Paints Company  
PO Box 364723  
San Juan, P.R. 00936-4723

**Emergency**

**CHEMTREC (USA)**

(800) 424-9300

**Customer Service: Harris Paints Company**

787-798-1005

### 2. Hazard identification of the product

#### 2.1. Classification of the substance or mixture

Flam. Aerosol 1;H222

Extremely flammable aerosol.

Press. Gas;H280

Contains gas under pressure; may explode if heated.

Skin Irrit. 2;H315

Causes skin irritation.

Eye Irrit. 2;H319

Causes serious eye irritation.

Muta 1B; H 340

May cause genetics defects

Carc 1B; H 350

May cause cancer

Repr. 2;H361D

Suspected of damaging the unborn child.

STOT SE 3;H336

May cause drowsiness or dizziness.

STOT RE 2;H373

May cause damage to organs through prolonged or repeated exposure.

Simple Asphyxiant

May displace oxygen and cause rapid suffocation.

#### 2.2. Label elements

Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.



# Safety Data Sheet

## Aerosol ALL Purpose Spray Paint

SDS Revision Date:

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### Danger

H222 Extremely flammable aerosol.

H280 Contains gas under pressure; may explode if heated.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H336 May cause drowsiness and dizziness.

H340 May cause genetic defects.

H350 May cause cancer

H361d Suspected of damaging the unborn child.

H373 May cause damage to organs through prolonged or repeated exposure.

May displace oxygen and cause rapid suffocation.

#### **[Prevention]:**

P101 If medical advice is needed, have product container or label at hand.

P102 Keep out of reach of children.

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P210 Keep away from heat / sparks / open flames / hot surfaces - No smoking.

P211 Do not spray on an open flame or other ignition source.

P251 Pressurized container: Do not pierce or burn, even after use.

P261 Avoid breathing dust / fume / gas / mist / vapors / spray.

P264 Wash thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P280 Wear protective gloves / eye protection / face protection.

#### **[Response]:**

P301+312 IF SWALLOWED: Call a POISON CENTER or doctor / physician if you feel unwell.

P302+352 IF ON SKIN: Wash with plenty of soap and water.

P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+351+338 IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.

P308+313 IF exposed or concerned: Get medical advice / attention.

P314 Get Medical advice / attention if you feel unwell.

P321 Specific treatment (see information on this label).

P330 Rinse mouth.

P337+313 If eye irritation persists: Get medical advice / attention.

P362 Take off contaminated clothing and wash before reuse.

#### **[Storage]:**

P403+233 Store in a well ventilated place. Keep container tightly closed.

P405 Store locked up.

P410+412 Protect from sunlight. Do not expose to temperatures exceeding 50 °C / 122 °F.

# Safety Data Sheet

## Aerosol ALL Purpose Spray Paint

SDS Revision Date:

10/16/19

Rev. 4

**[Disposal]:**

P501 Dispose of contents / container in accordance with local / national regulations.

### 3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Toluene CAS Number: 0000108-88-3	10 - <25	Flam. Liq. 2;H225 Repr. 2;H361d Asp. Tox. 1;H304 STOT RE 2;H373 Skin Irrit. 2;H315 STOT SE 3;H336	[1][2]
Ligroine Cas Number: 8032-32-4	2.5 - <10	Asp. Tox. 1;H304 Carc 1B, H 350 Eye Irrit. 2;H319 Flam Liq 4; H227 Muta1B, H340 Repr 1B; H360 Skin Irrit 2; H315 STOT RE 2;H373 STOT SE 3; H335 STOT SE 3; H336	[1][2]
Propane CAS Number: 0000074-98-6	10 - 25	Flam. Gas 1;H220 Press. Gas;H280	[1][2]
Butane CAS Number: 0000106-97-8	10 - 25	Flam. Gas 1;H220 Press. Gas;H280	[1][2]
Titanium dioxide CAS Number: 0013463-67-7	1.0 - 10	Carc 2; H351	[1][2]
Hexane CAS Number: 0000110-54-3	0 - 20	Flam. Liq. 2;H225 Repr. 2;H361f Asp. Tox. 1;H304 STOT RE 2;H373 Skin Irrit. 2;H315 STOT SE 3;H336	[1][2]
Acetone 67-64-1	0 - 20%	Flammable liquid - 2 , H225 Eye irritation - 2 H319 Specific target organ toxicity (single exposure) –3 H336	[1][2]
Ethylbenzene Cas Number: 100-41-4	< 1.0	Acute Tox, 4 H332 Acute Tox 5, H303 CArc 2; H351 Flam Liq 2; H 225	[1][2]

[1] Substance classified with a health or environmental hazard.

[2] Substance with a workplace exposure limit.

[3] PBT-substance or vPvB-substance.

\*The full texts of the phrases are shown in Section 16.

# Safety Data Sheet

## Aerosol ALL Purpose Spray Paint

SDS Revision Date:

10/16/19

Rev. 4

### 4. First aid measures

#### 4.1. Description of first aid measures

<b>General</b>	In all cases of doubt, or when symptoms persist, seek medical attention. Never give anything by mouth to an unconscious person. Show the SDS of this product.
<b>Inhalation</b>	Move person to fresh air. If breathing stops, apply artificial respiration and seek immediate medical attention. Place unconscious person on the side in the recovery position and ensure breathing can take place.
<b>Eyes</b>	Make sure to remove any contact lenses from the eyes before rinsing. Flush with large quantities of water for 15 minutes. Do not allow the person affected to rub or close their eyes.
<b>Skin</b>	Wash thoroughly with soap and water. Remove contaminated clothing immediately and wash skin with soap and water. If the product causes burn or freezing, clothing should not be removed as this could worsen the injury caused if it is stuck to the skin. If blisters form on the skin, these should never be burst, as this will increase the risk of infection.
<b>Ingestion</b>	Do not induce vomiting, can cause chemical pneumonitis and pulmonary edema. But if it does happen keep the head down to avoid aspiration. Get medical attention immediately. Provide fresh air, warmth and rest, preferably in comfortable upright sitting position.

#### 4.2. Most important symptoms and effects, both acute and delayed

**Overview** EFFECTS OF OVEREXPOSURE: Overexposure may result in light-headedness, staggering gait, giddiness, and possible nausea. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. May cause eye and skin irritation. SIGNS AND SYMPTOMS OF OVEREXPOSURE: Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists. Redness and itching or burning sensation may indicate eye or excessive skin exposure. MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory, skin, and eye disorders. Inhalation - dizziness, breathing difficulty, headaches, & loss of coordination.

Eye contact - severe irritation, tearing, redness, and blurred vision.

Skin contact - can dry and defeat skin causing cracks, irritation, and dermatitis.

Ingestion - can cause gastrointestinal irritation, vomiting, nausea & diarrhea.

Exposure to solvent vapor concentrations from the component solvents in excess of the stated occupational exposure limits may result in adverse health effects such as mucous membrane and respiratory system irritation and adverse effects on the kidneys, liver and central nervous system. Symptoms include headache, nausea, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

Repeated or prolonged contact with the preparation may cause removal of natural fat from the skin resulting in dryness, irritation and possible non-allergic contact dermatitis. Solvents may also be absorbed through the skin. Splashes of liquid in the eyes may cause irritation and soreness with possible reversible damage. See section 2 for further details.

**Inhalation** May cause drowsiness or dizziness.

# Safety Data Sheet

## Aerosol ALL Purpose Spray Paint

SDS Revision Date:

10/16/19

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**Eyes** Causes serious eye irritation.

**Skin** Causes skin irritation.

**Ingestion** Harmful if swallowed.

### 5. Fire-fighting measures

#### 5.1. Extinguishing media

Recommended extinguishing media; alcohol resistant foam, CO<sub>2</sub>, powder, water spray.

Do not use; water jet.

#### 5.2. Special hazards arising from the substance or mixture

Hazardous decomposition: May cause hazardous fumes when heated to decomposition. Fumes may contain carbon monoxide, carbon dioxide, oxides of nitrogen and oxides of metals listed in section II. Fumes may also contain oxides of nitrogen.

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

Do not spray on an open flame or other ignition source.

Pressurized container: Do not pierce or burn, even after use.

Avoid breathing dust / fume / gas / mist / vapors / spray.

#### 5.3. Advice for fire-fighters

Respiratory equipment should be worn to avoid inhalation of concentrated vapors. Water should not be used except as fog to keep nearby containers cool. Cool containers exposed to flames with water until well after the fire is out. Protective equipment for fire fighters. Minimum emergency facilities and equipment should be available (fire blanket, portable first aid kit)

Due to pressure build-up, closed containers exposed to extreme heat may explode. During emergency conditions, over-exposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

None

**ERG Guide No.** 126

### 6. Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

Isolate leaks provided that there is no additional risk for the people performing this task. Evacuate the area and keep out those without protection. Personal protection equipment must be used against potential contact with the spilt product. (see section 8). Above all prevent the formation of any vapor-aid flammable mixtures, through either ventilation or the use of an inertization agent. Destroy any source of ignition. Eliminate electrostatic charges by interconnecting all the conductive surfaces on which static electricity could form, and also ensuring that all surfaces are connected to the ground.

#### 6.2. Environmental precautions

This product is not classified as hazardous to the environment. Do not allow spills to enter drains or waterways.

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Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

### 6.3. Methods and material for containment and cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local state and federal hazardous regulations. Obey relevant law.

## 7. Handling and storage

### 7.1. Precautions for safe handling

Use non-sparking utensils when handling this material. Avoid hot metal surface. Keep away from excessive heat and open flames. KEEP OUT OF REACH OF CHILDREN.

Ground all equipment when handling flammable solvent borne materials; smoking is strictly prohibited in areas where this materials are used. Use impermeable aprons and protective clothing whenever to prevent skin contact. The use of head caps whenever possible is strongly recommended. Keep away from heat, sparks and open flame. Avoid spilling, skin and eye contact. Avoid inhalation of vapor's and spray mists. Do not eat, drink or smoke when using the product. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site.

See section 2 for further details. - [Prevention]:

### 7.2. Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.

Incompatible materials: Alkaline materials, strong acids and oxidizing materials.

Store in closed original container at temperatures between 5°C and 25°C. Keep away from heat, sparks and open flame. Protect from freezing and direct sunlight. Keep containers tightly closed. Keep upright.

Store separated from: Oxidizing material. Alkalis. Acids.

Ensure that waste and contaminated materials are collected and removed from the work area as soon as possible in a suitably labeled container.

See section 2 for further details. - [Storage]:

### 7.3. Specific end use(s)

No data available.

## 8. Exposure controls and personal protection

### 8.1. Control parameters

#### Exposure

CAS No.	Ingredient	Source	Value
000100-41-4	Ethylbenzene	OSHA	TWA 100 ppm (435 mg/m3) 8 hours
		ACGIH	No Established Limit
		NIOSH	No Established Limit

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		Supplier	No Established Limit
0000074-98-6	Propane	OSHA	TWA 1000 ppm (1800 mg/m3)
		ACGIH	Ensure Minimal Oxygen Content (ACGIH appendix F)
		NIOSH	TWA 1000 ppm (1800 mg/m3)
		Supplier	No Established Limit
0000106-97-8	Butane	OSHA	No Established Limit
		ACGIH	TWA: 600 ppm STEL: 750 ppm
		NIOSH	TWA 800 ppm (1900 mg/m3)
		Supplier	No Established Limit
0000108-88-3	Toluene	OSHA	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak) STEL 150 ppm
		ACGIH	TWA: 20 ppmR
		NIOSH	TWA 100 ppm (375 mg/m3) ST 150 ppm (560 mg/m3)
		Supplier	No Established Limit
0013463-67-7	Titanium dioxide	OSHA	TWA 15 mg/m3
		ACGIH	TWA: 10 mg/m32B, Revised 2006,
		NIOSH	Footnote ca
		Supplier	No Established Limit
0000110-54-3	Hexane	OSHA	TWA 500 ppm (1800 mg/m3)
		ACGIH	TWA: 20 ppmSkin
		NIOSH	TWA 50 ppm (180 mg/m3)
		Supplier	No Established Limit
00067-64-1	Acetone	OSHA	TWA 1000 ppm (2400 mg/m3) 8 hours
		ACGIH	No Established Limit
		NIOSH	No Established Limit
		Supplier	No Established Limit

### Carcinogen Data

CAS No.	Ingredient	Source	Value
0000074-98-6	Propane	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;
0000106-97-8	Butane	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;
0000108-88-3	Toluene	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: Yes; Group 4: No;
0013463-67-7	Titanium dioxide	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: Yes; Group 3: No; Group 4: No;
0000110-54-3	Hexane	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No

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IARC

Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;

### 8.2. Exposure controls

#### Respiratory

When spraying this material use a NIOSH approved cartridge respirator or gasmask suitable to keep airborne mists and vapor concentration below threshold limit values. When using in poorly ventilated and confined spaces, use a fresh air supplying respirator or a self-contained breathing apparatus.

#### Eyes

Wear approved, tight fitting safety glasses where splashing is probable.

#### Skin

Wear overalls to keep skin contact to a minimum.

#### Engineering Controls

Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn.

#### Other Work Practices

Wear appropriate clothing to prevent reasonably probable skin contact. No specific hygiene procedures noted, but good personal hygiene practices are always advisable, especially when working with chemicals. Eye washes and safety showers in the workplace are recommended. Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

See section 2 for further details. - [Prevention]:

## 9. Physical and chemical properties

<b>Appearance</b>	Aerosol
<b>Color</b>	According to the markings on the package
<b>Odor</b>	Strong (aromatics)
<b>Odor threshold</b>	Not Measured
<b>pH</b>	Not Measured
<b>Melting point / freezing point</b>	Not Measured
<b>Initial boiling point and boiling range</b>	-44-390°F
<b>Flash Point</b>	-155°F (Propellant)
<b>Evaporation rate (Ether = 1)</b>	Faster than ether
<b>Flammability (solid, gas)</b>	Gas
<b>Upper/lower flammability or explosive limits</b>	<b>Lower Explosive Limit:</b> Not Measured <b>Upper Explosive Limit:</b> Not Measured
<b>Vapor pressure (Pa)</b>	3.4 (mmHg)
<b>Vapor Density</b>	Heavier than air
<b>Specific Gravity</b>	1.09 (H <sub>2</sub> O=1)
<b>Solubility in Water</b>	Insoluble
<b>Partition coefficient n-octanol/water (Log K<sub>ow</sub>)</b>	Not Measured

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**Auto-ignition temperature** 770 °F (Propellant)

**Decomposition temperature** Not Measured

**Viscosity (cSt)** Not Measured

**Reactivity limit** NFP 1.40

**Reactivity result** 1.15

### 9.2. Other information

No other relevant information.

## 10. Stability and reactivity

### 10.1. Reactivity

Hazardous Polymerization will not occur.

### 10.2. Chemical stability

Stable under normal circumstances.

### 10.3. Possibility of hazardous reactions

No data available.

### 10.4. Conditions to avoid

Do not expose to heat or store at temperature above 120°F.

### 10.5. Incompatible materials

Alkaline materials, strong acids and oxidizing materials.

### 10.6. Hazardous decomposition products

May cause hazardous fumes when heated to decomposition. Fumes may contain carbon monoxide, carbon dioxide, oxides of nitrogen and oxides of metals listed in section II. Fumes may also contain oxides of nitrogen.

## 11. Toxicological information

### Acute toxicity

Exposure to solvent vapor concentrations from the component solvents in excess of the stated occupational exposure limits may result in adverse health effects such as mucous membrane and respiratory system irritation and adverse effects on the kidneys, liver and central nervous system. Symptoms include headache, nausea, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

Repeated or prolonged contact with the preparation may cause removal of natural fat from the skin resulting in dryness, irritation and possible non-allergic contact dermatitis. Solvents may also be absorbed through the skin. Splashes of liquid in the eyes may cause irritation and soreness with possible reversible damage.

2-butoxyethanol and its acetate are readily absorbed through the skin and will cause harmful effects on the blood.

Chronic Skin Painting studies with several solvents refined neutral oils did not produce evidence of skin cancer in mice.

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Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LD50, mg/L/4hr	Inhalation Dust/Mist LD50, mg/L/4hr	Inhalation Gas LD50, ppm
Toluene - (108-88-3)	636.00, Rat - Category: 4	8,400.00, Rabbit - Category: NA	No data available	No data available	No data available
Propane - (74-98-6)	No data available	No data available	658.00, Rat - Category: NA	No data available	No data available
Butane - (106-97-8)	No data available	No data available	658.00, Rat - Category: NA	No data available	No data available
Titanium dioxide - (13463-67-7)	10,000.00, Rat - Category: NA	10,000.00, Rabbit - Category: NA	No data available	6.82, Rat - Category: NA	No data available
Acetone- (67-64-1)	5,800mg/kg (rat)	7,426 mg/kg, Rabbit	76 mg/L 9 4h) LC 50 (rat)	No data available	No data available
n-Hexane (110-54-3)	5,100 mg/kg, mouse	3,000, Rabbit	No data available	No data available	No data available
Ethylbenzene (100-41-4)	3,500 mg/kg, Rat -	15,354 mg/kg rabbit, Rabbit - Category: 4	17.2 mg/L 94h) LC 50 – Rat	No data available	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	---	Not Applicable
Acute toxicity (dermal)	---	Not Applicable
Acute toxicity (inhalation)	---	Not Applicable
Skin corrosion/irritation	2	Causes skin irritation.
Serious eye damage/irritation	2	Causes serious eye irritation.
Respiratory sensitization	---	Not Applicable
Skin sensitization	---	Not Applicable
Germ cell mutagenicity	1B	May cause genetic defects
Carcinogenicity	1B	May cause cancer
Reproductive toxicity	1B	May damage fertility or the unborn child.
STOT-single exposure	3	May cause drowsiness or dizziness.
STOT-repeated exposure	2	May cause damage to organs through prolonged or repeated exposure.
Aspiration hazard	---	Not Applicable

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### 12. Ecological information

#### 12.1. Toxicity

Product is toxic to aquatic life.

WATER ACCOMATED FRACTIONS (WAF) OF HIGHLY REFINED BASE OIL DID NOT PRODUCE ACUTE TOXICITY IN FISH (100-1000MG/L), FRESH WATER ALGAE (50MG/L) OR DAPHNIA 10000MG/L) IN 48-96 HOUR LCD STUDIES

#### Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Toluene - (108-88-3)	5.80, Oncorhynchus mykiss	19.60, Daphnia magna	Not Available
n-Hexane (110-54-3)	4mg/L, Carassius auratus	Not Available	Not Available
ACetone (67-64-1)	5540 mg/L, Oncorhynchus mukiss	23.5 mg/L, Daphnia magna	3400 mg/L Chlorella pyrenoidosa
Ethylbenzene (100-41-4)	42.3 mg/L, Pimephales pomelas	75 mg/L, Daphnia magna	63mg/L. chlorella vulgaris

#### 12.2. Persistence and degradability

There is no data available on the preparation itself.

#### 12.3. Bioaccumulative potential

Not Measured

#### 12.4. Mobility in soil

No data available.

#### 12.5. Results of PBT and vPvB assessment

This product contains no PBT/vPvB chemicals.

#### 12.6. Other adverse effects

No data available.

### 13. Disposal considerations

#### 13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

### 14. Transport information

	DOT (Domestic Surface Transportation)	IMO / IMDG (Ocean Transportation)	ICAO/IATA
<b>14.1. UN number</b>	ORM-D	UN1950	UN1950
<b>14.2. UN proper shipping name</b>	UN1950, Aerosols, Limited Quantity, 2.1, NA	Aerosols, Limited Quantity	Aerosols, Limited Quantity

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<b>14.3. Transport hazard class(es)</b>	<b>DOT Hazard Class:</b> 2.1 <b>DOT Label:</b> 2.1	<b>IMDG:</b> 2.1 <b>Sub Class:</b> Not Applicable	<b>Air Class:</b> 2.1
<b>14.4. Packing group</b>	Not Applicable	Not Applicable	Not Applicable
<b>14.5. Environmental hazards</b>			
<b>IMDG</b>	Marine Pollutant: No		
<b>14.6. Special precautions for user</b>			
No further information			

### 15. Regulatory information

**Regulatory Overview** The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.

**Toxic Substance Control Act ( TSCA)** All components of this material are either listed or exempt from listing on the TSCA Inventory.

**WHMIS Classification** A D2A

**US EPA Tier II Hazards**

<b>Fire:</b> No
<b>Sudden Release of Pressure:</b> Yes
<b>Reactive:</b> No
<b>Immediate (Acute):</b> Yes
<b>Delayed (Chronic):</b> Yes

#### EPCRA 311/312 Chemicals and RQs (lbs):

Butan-1-ol ( 5,000.00)  
Toluene ( 1,000.00)

#### EPCRA 302 Extremely Hazardous :

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

#### EPCRA 313 Toxic Chemicals:

COBALT 2-ETHYL HEXANOATE

n-Hexane  
Toluene  
Ethylbenzene

#### Proposition 65 - Carcinogens (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

#### Proposition 65 - Developmental Toxins (>0.0%):

Toluene

#### Proposition 65 - Female Repro Toxins (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

#### Proposition 65 - Male Repro Toxins (>0.0%):

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

#### N.J. RTK Substances (>1%):

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Butan-1-ol  
Butane  
Propane  
Titanium dioxide  
Toluene  
Vinyl toluene  
white spirit

**Penn RTK Substances (>1%):**

Butan-1-ol  
Butane  
Propane  
Titanium dioxide  
Toluene  
Vinyl toluene

### 16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:

H220 Extremely flammable gas.  
H225 Highly flammable liquid and vapor.  
H226 Flammable liquid and vapor.  
H280 Contains gas under pressure; may explode if heated.  
H302 Harmful if swallowed.  
H303 May be harmful if swallowed.  
H304 May be fatal if swallowed and enters airways.  
H315 Causes skin irritation.  
H318 Causes serious eye damage.  
H319 Causes serious eye irritation.  
H225 highly flammable liquid and vapor  
H227 Combustible liquid  
H332 Harmful if inhaled  
H335 May cause respiratory irritation.  
H336 May cause drowsiness and dizziness.  
H340 May cause genetic defects.

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H350 May cause cancer

H351 Suspected of causing cancer

H361d Suspected of damaging the unborn child.

H373 May cause damage to organs through prolonged or repeated exposure.

**This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.**

To the best of our knowledge, the information contained here is accurate, obtained from sources believed to be accurate. We neither guarantee that any hazards mentioned are the only ones which exists. The manner of that use and whether there is any infringement of patents is the sole responsibility of the user.

End of Document

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**APPENDIX C**

COVID-19 Interim Health and Safety Guidance



**COVID-19 INTERIM HEALTH AND SAFETY GUIDANCE**

**CORPORATE HEALTH AND SAFETY MANAGER** : **Brian Hobbs, CIH, CSP**  
**EFFECTIVE DATE** : **03/2020**  
**REVISION DATE** : **01/10/2022**  
**REVISION NUMBER** : **8**

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## 1. PURPOSE

This guidance has been implemented to establish work practices, administrative procedures, and engineering controls to minimize potential exposure to SARS-CoV-2, the virus that causes COVID-19. The following guidance has been developed based on local, state and federal recommendations/requirements regarding COVID-19. The purpose of this document is to supplement existing site-specific Health and Safety Plans (HASPs) and provide interim health and safety guidance to minimize potential exposure to SARS-CoV-2. Should additional scientific information or regulatory information change, this document shall be updated accordingly.

## 2. SCOPE AND APPLICABILITY

This guidance covers all Roux employees and the subcontractors that Roux oversees. Site specific HASPs shall be developed to incorporate elements of mitigative measures against COVID-19 exposure. If work cannot be carried out in compliance with this guidance, the project shall be further evaluated by the Project Principal (PP), Office Manager (OM), and Corporate Health and Safety Director (CHSD) prior to work authorization.

Roux subcontractors are required to review, comply with, and implement Roux's COVID-19 Interim Health and Safety Guidance while on Site. Subcontractors may implement additional preventative measures as they see fit. All work shall be conducted in a manner consistent with the federal, state, and local guidance as it relates to COVID-19.

## 3. BACKGROUND

### *What is COVID-19?*

COVID-19 is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus that was first identified during an investigation into an outbreak in Wuhan, China. This virus continues to spread internationally and within the United States. Multiple variants of the virus that causes COVID-19 are circulating globally. There are currently several vaccines which have been developed which are authorized, recommended and effective at protecting you from getting sick.

### *What are the symptoms of COVID-19?*

Reported illnesses have ranged from mild symptoms to severe illness and death for confirmed COVID-19 cases. Symptoms may appear 2 to 14 days following exposure to the virus. People with these symptoms or combinations of symptoms may have COVID-19:

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

This list is not all possible symptoms. The CDC will continue to update this list as they learn more about the virus. For an updated symptom list please reference the [following link for CDC Symptoms of Coronavirus](#).

If someone develops emergency warning signs for COVID-19, they should be instructed to get medical attention immediately. Emergency warning signs can include those listed below; however, this list is not all inclusive. Please consult your medical provider for any other symptoms that are severe or concerning.

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion
- Inability to wake or stay awake
- Pale, gray, or blue-colored skin, lips, or nail beds, depending on skin tone

### ***How does COVID-19 spread?<sup>1</sup>***

Individuals who are within close contact (within 6 feet) of a person with COVID-19 or have direct contact with that person are at greatest risk of infection.

COVID-19 spreads in three main ways:

- Breathing in air when close to an infected person who is exhaling small droplets and particles that contain the virus.
- Having these small droplets and particles that contain virus land on the eyes, nose, or mouth, especially through splashes and sprays like a cough or sneeze.
- Touching eyes, nose, or mouth with hands that have the virus on them.

### **Transmission of SARS-CoV-2 from inhalation of virus in air farther than six feet from an infectious source can occur.**

Some infections can be spread by exposure to virus in small droplets and particles that can linger in the air for minutes to hours. These viruses may be able to infect people who are further than 6 feet away from the person who is infected or after that person has left the space. This kind of spread is referred to as **airborne transmission** and is an important way that infections like tuberculosis, measles, and chicken pox are spread. Per published reports, factors that increase the risk of SARS-CoV-2 infection under these circumstances include:

- Enclosed spaces with inadequate ventilation or air handling within which the concentration of exhaled respiratory fluids, especially very fine droplets and aerosol particles, can build-up in the air space.
- Increased exhalation of respiratory fluids if the infectious person is engaged in physical exertion or raises their voice (e.g., exercising, shouting, singing).
- Prolonged exposure to these conditions, typically more than 15 minutes.

### **Spread from contact with contaminated surfaces or objects is less common.**

Respiratory droplets can also land on surfaces and objects. It is possible that a person could get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or eyes. Spread from touching surfaces is not thought to be a common way that COVID-19 spreads.

## **4. TRAINING REQUIREMENTS**

All employees with potential exposure to COVID-19 shall be provided training that incorporates COVID-19 exposure mitigation strategies, such as implementation of proper social distancing, personal hygiene (e.g., handwashing), as well as disinfection procedures, as outlined by CDC guidelines.

## **5. EXPOSURE RISK POTENTIAL**

Worker risk of occupational exposure to COVID-19 can vary from very high, high, medium, or lower (caution) risk. This level of exposure is dependent on several factors, which can include industry type; need for contact within 6 feet of people known to be or suspected of being infected with COVID-19; density of work environment; and industrial setting (i.e., healthcare building, occupied interior work area, minimal ventilation).

Provided below is background risk level information taken from the U.S. Department of Labor Occupational Safety and Health Administration Guidance on preparing workplaces for COVID-19. Risk evaluations for each project shall be conducted by the PP and OM in consultation with the CHSD to ensure Roux employees and subcontractors remain within the lower exposure (caution) category. If it is identified there is a medium exposure risk or higher, further evaluation and mitigative measures shall be evaluated to reduce overall exposure risk prior to work authorization.

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<sup>1</sup> How COVID-19 Spreads <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html#edn1>

***Very High Exposure Risk (Activities not conducted by Roux)***

Very high exposure risk includes occupations/work activities with high potential for exposure to known or suspected sources of COVID-19 during specific medical, postmortem, or laboratory procedures. This can include but is not limited to:

- Healthcare workers (e.g., doctors, nurses, dentists, paramedics, emergency medical technicians) performing aerosol-generating procedures (e.g., intubation, cough induction procedures, bronchoscopies, some dental procedures and exams, or invasive specimen collection) on known or suspected COVID-19 patients.
- Healthcare or laboratory personnel collecting or handling specimens from known or suspected COVID-19 patients (e.g., manipulating cultures from known or suspected COVID-19 patients).

***High Exposure Risk (Activities not conducted by Roux)***

High exposure risk occupations/work activities include exposure to known or suspected COVID-19 positive individuals. This can include but not limited to:

- Healthcare delivery and support staff (hospital staff who must enter patients' rooms) exposed to known or suspected COVID-19 patients.
- Medical transport workers (ambulance vehicle operators) moving known or suspected COVID-19 patients in enclosed vehicles.
- Mortuary workers involved in preparing bodies for burial or cremation of people known to have, or suspected of having, COVID-19 at the time of death.
- Those who have frequent or sustained contact with coworkers, including under close working conditions indoors or in poorly ventilated spaces in various types of industrial, manufacturing, agriculture, construction, and other critical infrastructure workplaces.
- Those who have frequent indoor or poorly ventilated contact with the general public, including workers in retail stores, grocery stores or supermarkets, pharmacies, transit and transportation operations, law enforcement and emergency response operations, restaurants, and bars.

***Medium Exposure Risk***

Medium exposure risk occupations/work activities include those that require frequent and/or close contact with (i.e., within 6 feet for a cumulative total of 15 minutes or more over a 24-hour period)) people who may be infected with COVID-19, but who are not known or suspected to be COVID-19 positive. For most of our worksites, it is assumed there is on-going community transmission for COVID-19. Therefore, workers who work at sites and may have contact with the general public, other contractors, high-population-density work environments (i.e., greater than 10 people) fall within medium exposure risk group category. This can include, but is not limited to, sampling events that require two or more workers to collect and log samples in close contact or work occurring in an interior space with limited ventilation and several workers present.

### **Lower Exposure Risk (Caution)**

Lower exposure risk (caution) occupations/work activities are those that do not require close contact (within 6 feet for a cumulative total of 15 minutes or more over a 24-hour period) with other people. During these activities, there is limited contact (i.e., within 6 feet of) the general public or other workers. Workers in this category have minimal occupational contact with the public and other coworkers. This includes construction oversight that does not require close contact, sampling or gauging events performed by one worker and our remote workers as well as office workers who do not have frequent close contact with coworkers, clients, or the public.

## **6. CDC FULLY VACCINATED GUIDANCE**

Vaccination is a vital tool to reduce the presence and severity of COVID-19 cases in the workplace and communities. Roux has recommended the vaccine for all employees. Should vaccines be required by local/state/client requirements Roux shall ensure our workforce shall comply with such requirement. Roux Human Resources shall collect information on vaccination status of employees who have been vaccinated to make informed decisions and ensure conformance with state/local requirements, as appropriate.

In general, employees shall be considered fully vaccinated:

- 2 weeks after their second dose in a 2-dose series, such as the Pfizer or Moderna vaccines, or
- 2 weeks after a single-dose vaccine, such as Johnson & Johnson's Janssen vaccine.

If you do not meet these requirements, regardless of age, you are not fully vaccinated and are asked to continue to take all precautions until you are fully vaccinated. CDC recommends that people remain up to date with their vaccines, which includes [additional doses](#) for individuals who are immunocompromised or [booster doses](#) at regular time points. Individuals who are [moderately or severely immunocompromised](#) should get an additional primary shot and a booster shot.

## **7. COVID-19 HEALTH SCREENING**

### **7.1 Roux Employees**

Depending on local/state/client requirements, Roux employees may self-attest to a COVID-19 Daily Health Questionnaire which is to be completed at home through a mobile application on scheduled workdays. The purpose of this program is to ensure business continuity as well as mitigate any potential exposure to our employees and others if it is determined employees are at-risk for contracting COVID-19. As part of this self-attestation, all employees are required to take their temperatures daily at home to confirm they do not have a fever ( $\geq 100.4$ ). Employees who answer yes to any of these questions are instructed to contact their Office Manager and/or Department Head immediately and should not enter the office or go to a field site. Information shall be used to determine appropriate internal response in consultation with the Human Resources Director (HRD) and CHSD.

Below, you will find our COVID-19 Daily Health Questionnaire that all Roux employees are required to self-attest to **every scheduled workday by 9:30 AM.** If employees do not promptly fill out the questionnaire by the time listed above, there will be additional follow up by HR, H&S, and/or OMs.

*According to the U.S. Centers for Disease Control and Prevention & the World Health Organization, COVID-19 Symptoms include:*

- *Fever ( $\geq 100.4^{\circ}F$ ) or chills*
- *Cough*
- *Shortness of breath or difficulty breathing*
- *Fatigue*
- *Muscle or body aches*
- *Headache*
- *New loss of taste or smell*
- *Sore throat*
- *Congestion or runny nose*
- *Nausea or vomiting*
- *Diarrhea*

*Have you experienced any of the COVID-19 related symptoms noted above in the last 14 days? Please Note: We do not expect employees to answer “yes” to the symptoms question if these are symptoms you normally experience due to another condition or medication.*

- Yes
- No

*Have you been in close contact\* with someone who is suspected or confirmed to have COVID-19 or who is under investigation for COVID-19 within the last 14 days? \* Close contact as defined by the CDC is being within 6 feet of someone who has COVID-19 for a cumulative total of 15 minutes or more over a 24-hour period.*

- Yes
- No

*Have you traveled outside of the country, been on a cruise ship and/or traveled to areas within the United States which have state mandated travel restrictions in the last 14 days?*

- Yes
- No

*Have you tested positive for COVID-19 within the last 14 days?*

- Yes
- No

## **7.2 Subcontractors**

In an effort to mitigate the risk of transmission of COVID-19, Subcontractors who shall perform work onsite are required to attest to the fitness of their work crew on a daily basis. This requires each worker to self-assess by asking themselves the four questions listed in the section above and also contained within the Roux Subcontractor Work Crew COVID-19 Daily Health Attestation. If any crew member answers “Yes” to any of the questions, that worker is not to report to the field site and should seek proper medical advice in accordance with local, state and federal guidelines. In addition, the Sub-Contractor shall self-attest to vaccination status in order for the Field Team to ensure conformance with updated guidance for fully vaccinated individuals should state/local/client requirements allow. See Section 6. CDC Fully Vaccinated Guidance.

On a daily basis, the subcontractor supervisor must provide the Subcontractor Work Crew COVID-19 Daily Health Attestation complete with the names of all work crew fit to be on the Site for that day (i.e., who have answered “No” to all questions on the self-assessment) to Roux’s Project Manager or Site Supervisor. The Subcontractor must notify Roux if there have been any “Yes” responses daily. Subcontractors shall not be required to provide the name or any other personal information of any employee who has answered “Yes” to any of the self-assessment questions, however, the Subcontractor should provide the date and times that the employee has been onsite in the prior 14 days. Records shall be maintained within the project files indicating health screening has been performed, records shall be retained for not less than 14 days following the date of submission. The Roux Subcontractor Work Crew COVID-19 Daily Health Check Attestation can be found within Appendix A.

## **8. SELF-ISOLATION & QUARANTINE**

### **8.1 Self-Isolation**

***What if I am asked to self-isolate at home and when can I return from home isolation?***

Depending on the situation, if you are COVID-19 positive or suspected to have COVID-19, employees may be required to self-isolate in their homes, as per CDC or local health department guidelines. Roux shall follow CDC guidance in areas where local/state requirements allow. The following table below outlines CDC isolation guidance.

Day 0 is your first day of symptoms or a positive viral test. Day 1 is the first full day after your symptoms developed or your test specimen was collected. If you have COVID-19 or have symptoms, isolate for at least 5 days.

<p>IF YOU Tested positive for COVID-19 or have symptoms, regardless of vaccination status</p>	<p><b>Stay home for at least 5 days</b> Stay home for 5 days and <a href="#">isolate</a> from others in your home.</p> <p>Wear a well-fitted mask if you must be around others in your home.</p>	<p><b>Ending isolation if you had symptoms</b> <a href="#">End isolation after 5 full days</a> if you are fever-free for 24 hours (without the use of fever-reducing medication) and your symptoms are improving.</p> <p><b>Ending isolation if you did NOT have symptoms</b> <a href="#">End isolation after at least 5 full days</a> after your positive test.</p> <p><b>If you were severely ill with COVID-19</b> You should isolate for at least 10 days. <a href="#">Consult your doctor before ending isolation.</a></p>	<p><b>Take precautions until day 10</b></p> <p><b>Wear a mask</b> Wear a well-fitted mask for 10 full days any time you are around others inside your home or in public. Do not go to places where you are unable to wear a mask.</p> <p><b>Avoid travel</b></p> <p><b>Avoid being around people who are at high risk</b></p>
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## 8.2 Quarantine

Employees may be required to self-quarantine due to potential exposure with a suspected and/or confirmed COVID-19 positive individual as well as recent travel as per local/state guidelines. People in quarantine should stay home, separate themselves from others, monitor their health, and follow directions from their state or local health department.

### 8.2.1 Close Contact Quarantine

The following table below outlines CDC quarantine guidance. The date of your exposure is considered day 0. Day 1 is the first full day after your last contact with a person who has had COVID-19. Stay home and away from other people for at least 5 days.

<p>IF YOU Were exposed to COVID-19 and are NOT <a href="#">up-to-date</a> on COVID-19 vaccinations</p>	<p><b>Quarantine for at least 5 days</b></p> <p><b>Stay home</b> Stay home and <a href="#">quarantine</a> for at least 5 full days.</p> <p>Wear a well-fitted mask if you must be around others in your home.</p> <p><b>Get tested</b> Even if you don't develop symptoms, get tested at least 5 days after you last had close contact with someone with COVID-19.</p>	<p><b>After quarantine</b></p> <p><b>Watch for symptoms</b> Watch for symptoms until 10 days after you last had close contact with someone with COVID-19.</p> <p><b>If you develop symptoms</b> Isolate immediately and get tested. Continue to stay home until you know the results. Wear a well-fitted mask around others.</p>	<p><b>Take precautions until day 10</b></p> <p><b>Wear a mask</b> Wear a well-fitted mask for 10 full days any time you are around others inside your home or in public. Do not go to places where you are unable to wear a mask.</p> <p><b>Avoid travel</b></p> <p><b>Avoid being around people who are at high risk</b></p>
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<p><b>IF YOU</b> Were exposed to COVID-19 and are <a href="#">up-to-date</a> with vaccination OR had confirmed COVID-19 within the past 90 days (you tested positive using a viral test)</p>	<p><b>No quarantine</b> You do not need to stay home <b>unless</b> you develop symptoms.</p> <p><b>Get tested</b> Even if you don't develop symptoms, it is recommended to get tested at least 5 days after you last had close contact with someone with COVID-19</p>	<p><b>Watch for symptoms</b> Watch for symptoms until 10 days after you last had close contact with someone with COVID-19.</p> <p><b>If you develop symptoms</b> <a href="#">Isolate</a> immediately and get tested. Continue to stay home until you know the results. Wear a well-fitted mask around others.</p>	<p><b>Take precautions until day 10</b></p> <p><b>Wear a mask</b> Wear a well-fitted mask for 10 full days any time you are around others inside your home or in public. Do not go to places where you are unable to wear a mask.</p> <p><b>Avoid travel</b></p> <p><b>Avoid being around people who are at high risk</b></p>
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### 8.2.2 Travel Related Quarantine/Testing

All travel out of state must be communicated with the OM and/or Department Head prior to departure. Please note, some federal/state/local entities require submissions of traveler health forms and potentially require additional testing for COVID-19. It is expected all Roux employees will comply with such federal/state/local travel requirements.

## 9. WORKPLACE CONTROLS

During the project planning phase, worksite evaluations shall be carried out by the PP and OM in consultation with the CHSD to determine risk exposure levels for work activities. If it is determined there is a high exposure risk level or higher, additional workplace controls shall be evaluated and implemented as required in addition to the basic infection prevention measures outlined below in Section 10. Additional workplace controls can include engineering controls (i.e., ventilation, physical barriers), administrative controls (i.e., minimizing contact between workers, rotating shifts, site specific training), and additional personal protective equipment (i.e., respiratory protection). If exposure risk cannot be mitigated, potential project postponement may be necessary at the discretion of the OM in consultation with the CHSD.

A Job Safety Analysis (JSA) has been developed and is provided in Appendix B, which summarizes and applies concepts within this guidance, including the infection prevention measures listed below. This JSA shall be required for all fieldwork in areas where there is community-based transmission of COVID-19.

## 10. INFECTION PREVENTION MEASURES

The following is basic infection prevention and personal hygiene practices which shall be implemented for all Roux field activities as well as in the office setting.

- **Personal Hygiene**
  - Wash your hands often with soap and water for at least 20 seconds.
    - If soap and water are not available, use an alcohol-based sanitizer that contains at least 60% alcohol.
    - Key times to wash your hands include after blowing your nose, coughing or sneezing, after using the restroom, and before eating or preparing food.
  - Do not touch your eyes, face, nose and mouth with unwashed hands.
  - Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.
  - Throw potentially contaminated items (e.g., used tissues) in the trash.

- **Avoid Close Contact/Secondary Contact with People and Potentially Contaminated Surfaces**
  - Apply appropriate social distance (6+ feet), as appropriate.
  - Do not work in areas with limited ventilation with other Site workers (e.g., small work trailer which lacks HVAC system).
  - Morning tailgate/safety meetings are recommended to occur outside or in well ventilated work trailers.
  - Contact your lab/equipment vendor to confirm equipment is properly disinfected prior to being shipped.
  - Do not carpool with others unless all individuals are comfortable with traveling together.
  - For company owned vehicles limit sharing of vehicles with coworkers. If unable to limit sharing of company owned vehicles, properly clean vehicle before driving with a focus on commonly touched surfaces (e.g., steering wheels, shifters, buttons, etc.).
  - Use caution when using public restrooms, portable toilets. Use paper towel as a barrier when touching door handles and faucets.
- **Cleaning and Disinfecting**
  - Clean high touched surfaces daily. Examples of high-touch surfaces include: counters, tables, doorknobs, handles, stair rails, desks, toilets, faucets, and sinks. In most situations, regular cleaning (at least once a day) is enough to sufficiently remove virus that may be on surfaces. However, if certain conditions apply, you may choose to disinfect after cleaning. When there is no confirmed or suspected COVID-19 cases known to have been in a space, cleaning once a day is usually enough to sufficiently remove virus that may be on surfaces and help maintain a healthy facility.
  - You may want to either clean more frequently or choose to disinfect in addition to cleaning in shared spaces if the space:
    - Is a high traffic area, with a large number of people,
    - Is poorly ventilated,
    - Does not provide access to handwashing or hand sanitizer, or
    - The space is occupied by individuals at increased risk for severe illness.

If a someone who tested or is presumed COVID-19 positive and has been in your facility within the last 24 hours, you should clean and disinfect the space. This will be done in consultation with the CHSD.

The following below outlines cleaning and disinfection protocols for specific types of surfaces as required. Please consult with the CHSD when developing site-specific cleaning and disinfection protocols.

- **Hard (Non-porous) Surfaces**
  - If surfaces are dirty, they should be cleaned with a detergent/soap and water prior to disinfection.
  - Refer to the manufacturer's instructions to ensure safe and effective use of the product and wear appropriate personal protective equipment (e.g., gloves, safety glasses, face shield).
  - Many products require:
    - Keeping surface wet for a period of time (i.e., contact time).
      - Refer to manufacturer's instructions outlining adequate contact time.
    - Precautions such as wearing gloves and making sure you have good ventilation during use of the product.
  - Disposable gloves should be removed aseptically and discarded after cleaning. Wash hands immediately following removal of gloves. Refer to Appendix C for how to remove gloves aseptically.

- If products on [EPA List N: Disinfectants for Coronavirus \(COVID-19\)](#) are not available, bleach solutions can be used if appropriate for the surface and will be effective against coronaviruses when properly diluted.
  - Most household bleach contains 5%–9% sodium hypochlorite. Do not use a bleach product if the percentage is not in this range or is not specified, such as some types of laundry bleach or splash-less bleach as these are not appropriate for disinfection.
  - Follow the directions on the bleach bottle for preparing a diluted bleach solution. If your bottle does not have directions, you can make a bleach solution for disinfecting by mixing:
    - 5 tablespoons (1/3 cup) of bleach per gallon of room temperature water; OR
    - 4 teaspoons of bleach per quart of room temperature water.
  - Follow the manufacturer’s application instructions for the surface. If instructions are not available, leave the diluted bleach solution on the surface for at least 1 minute before removing or wiping. This is known as the “contact time” for disinfection. The surface should remain visibly wet during the contact time.
  - Ensure proper ventilation during and after application (for example, open windows).
  - Never mix household bleach (or any disinfectants) with any other cleaners or disinfectants. This can cause vapors that may be very dangerous to breathe in.
  - Make a new diluted bleach solution daily. Bleach solutions will not be as effective after being mixed with water for over 24 hours. [Products with EPA-approved emerging viral pathogen claims are expected to be effective against COVID-19](#). Follow the manufacturer’s instructions for all cleaning and disinfecting products (e.g., concentration, application method and contact time, etc.).
- **Soft (Porous) Surfaces**
  - For soft (porous) surfaces, remove visible contamination if present and clean with appropriate cleaners indicated for use on the surfaces. After cleaning:
    - Launder items as appropriate in accordance with the manufacturer’s instructions. If possible, launder using the warmest appropriate water setting for the item and dry items completely; or
    - Use products with the EPA-approved emerging viral pathogens that claim they are suitable for porous surfaces.
- **Electronics**
  - For electronics such as tablets, touch screens, keyboards, remote controls, etc. remove visible contamination if present.
    - Follow the manufacturer’s instructions for all cleaning and disinfection products.
    - Consider use of wipeable covers for electronics.
    - If no manufacturer guidance is available, consider the use of alcohol-based wipes or sprays containing at least 70% alcohol to disinfect touch screens. Dry surfaces thoroughly to avoid pooling of liquids.
- **Linens, Clothing, and Other Items that Go in the Laundry**
  - Although it is unlikely field clothing would become potentially contaminated with COVID-19, it is recommended that field staff regularly launder field clothing following any field event upon returning home.
  - In order to minimize the possibility of dispersing the virus from potentially contaminated clothing, do not shake dirty laundry.
  - Wash items as appropriate in accordance with the manufacturer’s instructions. If possible, launder items using the warmest appropriate water setting for the items and dry items completely.
  - Clean and disinfect hampers or other containers used for transporting laundry according to guidance listed above.

- **Office/Site Specific-Cleaning and Disinfection Protocols**

- Each office and long-term field site shall develop internal cleaning and disinfecting practices, which can be broken into three categories: routine cleaning; enhanced cleaning and disinfecting; and deep cleaning and disinfecting.
- In the instance there is someone who is suspected or confirmed positive for COVID-19 and has worked at the office or field site within the last 24 hours, deep cleaning and disinfecting shall be considered. The CHSD shall work with the OM and Office Health and Safety Manager (OHSM) to evaluate site-specific measures that shall be carried out prior to deep cleaning and disinfecting. If more than 24 hours have passed since the person who is sick or diagnosed with COVID-19 has been in the space, cleaning shall be carried out. You may choose to also disinfect depending on certain conditions and in consultation with the CHSD.
- If deep cleaning and disinfection is carried out the following will be considered:
  - Closing off all areas potentially affected and wait at least several hours before you clean and disinfect.
  - Areas should remain closed off until cleaning and disinfecting takes place; if able, ventilation shall be increased in the space (e.g., opening doors, windows, increasing CFM).

## **11. FACE COVERINGS**

The CDC recommends the use of face coverings/masks in public settings where other social distancing measures are difficult to maintain. Masks are required on planes, buses, trains and other forms of public transportation traveling into, within, or out of the United States and in U.S. indoor transportation hubs such as airports and stations. The use of face coverings is to supplement and NOT replace the existing practices outlined above.

Based on existing studies and on-going recommendations and/or requirements from federal, state, and local entities, Roux is recommending the use of face coverings, when appropriate. Appropriate use is defined when local authorities or clients require the use of face coverings in conjunction with established social distancing, or if an employee elects to use a cloth covering on their own accord. Roux will provide appropriate face coverings that shall meet the basic requirements outlined by the CDC guidance.

Face Coverings (i.e., masks) should:

- Have two or more layers of washable, breathable fabric;
- Completely cover the nose and mouth;
- Fit snugly against the sides of the face and not have any gaps; and
- Have a nose wire to prevent air from leaking out of the top of the mask.

When donning and doffing the face covering, individuals should avoid touching their eyes, nose, and mouth. Following removal of the face covering, employees should wash their hands immediately using the guidelines described in Section 10 Infection Prevention Measures-Personal Hygiene above. Face coverings should be routinely washed depending on the frequency of use.

## APPENDIX A

### Roux Subcontractor Work Crew COVID-19 Daily Health Screening Questionnaire

## Subcontractor Work Crew COVID-19 Daily Health Attestation

Date:	
Company Name:	
Supervisor Name:	Signature:
Project Name:	
Site Address:	
Number of Workers on site:	
<p>Prior to entry onto a field site, the following questions shall be asked by the Subcontractor Supervisor to their work crew. <b>Subcontractors and Field Teams shall self-attest to vaccination status in order to ensure compliance with state/local guidance for fully vaccinated and unvaccinated individuals.</b></p> <p>It is preferred this questionnaire is completed for each individual prior to their arrival at the field site. If the answer to any of these questions is YES, the worker is not to report to the field site and seek proper medical advice, in accordance with CDC Guidelines. <b>The Subcontractor Supervisor must provide this form on a daily basis to the Roux primary contact for the project and notify Roux of any YES responses.</b></p>	
1. Have you experienced any signs/symptoms of COVID-19 such as fever ( $\geq 100.4^{\circ}\text{F}$ ), cough, shortness of breath, chills, fatigue, muscle/body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea/vomiting or diarrhea in the last 5 days?	
2. Have you been in close contact* with someone who is suspected or confirmed to have COVID-19 or who is under investigation for COVID-19 within the last 5 days?  *Close contact as defined by the CDC is being within 6 feet of someone who has COVID-19 for a cumulative total of 15 minutes or more over a 24-hour period. Those who are up to date on COVID-19 vaccinations or had confirmed COVID-19 within the past 90 days (you tested positive using a viral test) you do not need to quarantine.	
3. Have you traveled outside of the country, been on a cruise ship and/or traveled to areas within the United States which have state mandated travel restrictions in the last 5 days?	
4. Have you tested positive for COVID-19 within the last 5 days?	
Please list the crew member's names on site for the day.	
1.	8.
2.	9.
3.	10.
4.	11.
5.	12.
6.	13.
7.	14.

## APPENDIX B

### Job Safety Analysis-Working in Areas Affected by COVID-19

JOB SAFETY ANALYSIS Ctrl. No. CVD-19		DATE: 01/10/2022	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>	WORK TYPE <b>Fieldwork</b>	WORK ACTIVITY (Description) <b>Working in Areas Affected by Coronavirus</b>		
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Kristina DeLuca	Health and Safety Specialist	Brian Hobbs	CHSD	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT – In field <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES – In field	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES – Steel/composite toe in fie	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING – High visibility vest in field	<input checked="" type="checkbox"/> GLOVES – Leather/cut-resistant in field and nitrile as needed <input type="checkbox"/> OTHER	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
Face covering/mask, nitrile gloves, hand soap, water source, hand sanitizer, disinfectant spray and disinfectant wipes.				
<b>Commitment to Safety – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.</b>				
<b>SOCIAL DISTANCING: Maintain 6' of distance between yourself and all other people at all times. If you do not believe the scope of work can be conducted while maintaining this distance, contact your Project Manager immediately.</b>				
Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS		
1. Project Preplanning	N/A	<ul style="list-style-type: none"> <li>Review and follow COVID-19 CDC, Roux, Client and local orders/protocols.</li> <li>Ensure all workers are fit for duty - anyone feeling sick should remain at home even if symptoms do not align with COVID-19. If a worker has been in contact with someone potentially positive or positive for COVID-19, contact your Office Manager.</li> <li>Determine PPE needs and ensure adequate supply of disinfectant wipes/spray, soap and water or hand sanitizer at Site. Due to high demands and limited supply, plan ahead.</li> <li>Use the minimum number of employees necessary to safely complete the work.</li> </ul>		
2. Mobilization	<b>Exposure:</b> Becoming infected or infecting co-workers	<p><b>Personal/Rental/Roux Owned Vehicle</b></p> <ul style="list-style-type: none"> <li>Avoid carpooling, unless all individuals are up to date on vaccinations.</li> <li>Verify workers/other people are not approaching vehicle prior to exiting the vehicle. Maintain 6' of distance from general public, as appropriate.</li> </ul> <p><b>Public Transportation</b></p> <ul style="list-style-type: none"> <li>Public transit should not be used unless absolutely necessary. Consider renting a car rather than taking public transit. If public transit is required, wear appropriate face covering/mask and apply social distancing (6 ft). Wash hands or use hand sanitizer immediately after.</li> </ul> <p><b>Hotel Stay (Refer to COVID-19 H&amp;S Guidance for more info)</b></p> <ul style="list-style-type: none"> <li>If a hotel stay is deemed necessary for the given field work, ensure that you clean your room upon initial arrival.</li> <li>Place the "Do Not Disturb" placard on the room while away and limit housekeeping services to the extent feasible during your stay to minimize the reintroduction and spread of the virus from others.. Wash hands or use hand sanitizer often.</li> </ul>		
3. Tailgate Meeting	<b>Exposure:</b> Becoming infected or infecting co-workers	<ul style="list-style-type: none"> <li>Perform outside or indoors in areas with ample ventilation.</li> <li>If unvaccinated, maintain at least a 6+ ft distance between you and others.</li> <li>Discuss primary infection prevention measures listed below.</li> <li>Discuss COVID-19 symptoms with coworkers and subcontractors to ensure fitness for duty. Anyone exhibiting signs or symptoms should be instructed to leave the Site, contact your Project Manager.</li> </ul>		

<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 six 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; 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".

4. Site Activities	<p><b>Exposure:</b> Becoming infected or infecting co-workers</p>	<ul style="list-style-type: none"> <li>• Coordinate field activities at the beginning of the day (i.e. Tailgate meeting) to minimize time spent in crowded spaces or overlap while completing job tasks.</li> <li>• Don face coverings as appropriate.</li> <li>• Apply social distancing (6+ ft) when interacting with others if unvaccinated. If anyone comes within 6 ft of you while conducting work and your work prevents you from moving away, politely ask them to move back. If others are unable to move from your space, stop work and leave area.</li> <li>• Minimize shaking hands or touching others.</li> <li>• Minimize sharing of equipment or other items with co-workers and subcontractors unless wearing appropriate PPE (e.g. nitrile gloves), as appropriate.</li> <li>• If anyone is experiencing COVID-19 signs or symptoms in your vicinity, stop work and leave the area.</li> <li>• Do not work in areas with limited ventilation with others.</li> <li>• Cover your mouth and nose with tissue or paper towel or with your elbow when coughing or sneezing and wash hands or use hand sanitizer immediately after. If sick contact SHSO/PM and leave Site immediately.</li> <li>• Clean work surfaces/areas with approved cleaners you're responsible for (ex: desk, office doorknob, computer, etc.) at least daily.</li> <li>• Avoid public spaces and going out to eat by bringing your own lunch to the Site. If performing work in high density urban areas, it is recommended all food must be consumed at or in your vehicle or within designated work trailer. Wash hands or use hand sanitizer before eating and immediately after.</li> </ul>
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#### Primary Infection Prevention Measures

- Wash your hands often with soap and water for at least 20 seconds.
  - If soap and water are not available, use an alcohol-based sanitizer that contains at least 60% alcohol. Key times to wash hands include after blowing your nose, coughing or sneezing, after using the restroom, and before eating or preparing food.
- Do not touch your eyes, face, nose and mouth with unwashed hands.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw potentially contaminated items (e.g. used tissues) in the trash.
- Avoid close contact/secondary contact with people and potentially contaminated surfaces.
  - Apply appropriate social distance (6+ feet).
  - Minimize handshaking/touching others and use caution when accessing public spaces.
- Clean frequently touched surfaces daily. Commonly touched items can include but are not limited to tables, doorknobs, light switches, countertops, handles, desks, phones, keyboard, toilets, sinks and field equipment. If surfaces are dirty, they should be cleaned with soap and water prior to disinfection. If surface cannot be cleaned/disinfected, then wash hands or use sanitizer as soon as possible.

<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 six 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".

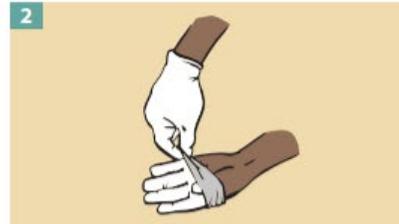
**APPENDIX C**  
**How to Remove Gloves**

# How to Remove Gloves

To protect yourself, use the following steps to take off gloves



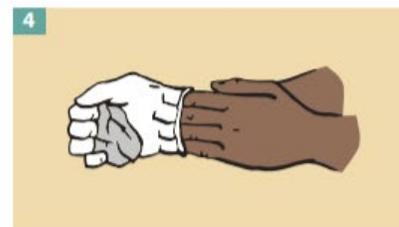
1 Grasp the outside of one glove at the wrist.  
Do not touch your bare skin.



2 Peel the glove away from your body,  
pulling it inside out.



3 Hold the glove you just removed in  
your gloved hand.



4 Peel off the second glove by putting your fingers  
inside the glove at the top of your wrist.



5 Turn the second glove inside out while pulling  
it away from your body, leaving the first glove  
inside the second.



6 Dispose of the gloves safely. Do not reuse the gloves.



7 Clean your hands immediately after removing gloves.

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**APPENDIX D**

Incident Investigation and Reporting Management Program

**INCIDENT INVESTIGATION AND  
REPORTING MANAGEMENT PROGRAM**

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

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**APPENDICES**

- Appendix A – Accident Report and Investigation Form
- Appendix B – Near Loss Form
- Appendix C – Injury Illness Reporting Flow Chart

## 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 management program for reporting Environmental Health and Safety (EHS) incidents and near losses, investigation and correcting the causes of incidents, tracking incidents and corrective actions taken, and sharing the cause and corrective actions with Roux personnel. These practices and procedures establish a method to track progress and improvements to the company EHS performance.

## 2. SCOPE AND APPLICABILITY

These procedures apply to all Roux employees. Employees are required to follow these procedures for all incidents involving Roux personnel, or other personnel (e.g., subcontractors) working for Roux, regardless of the specific work activity or work location.

This program is intended, in part, to fulfill the Occupational Safety and Health Administration (OSHA) occupational injury and illness reporting and recording requirements cited in the Code of Federal Regulations (CFR) at 29 CFR 1904.

## 3. RESPONSIBILITIES

It shall be the responsibility of all Roux employees to report all incidents as soon as possible to the PM (or Administrative Manager for office-related incidents), SHSO, OHSM and OM, regardless of severity. Additionally, the following positions have specific responsibilities for implementing this specific SOP.

### 3.1 Corporate Health and Safety Manager (CHSM)

- The CHSM has the responsibility of ensuring that a system is in place for reporting, investigation, correction, and communicating of EHS incidents and near losses.
- The CHSM has the overall responsibility of implementing and communicating the contents of this program to Office Health and Safety Managers (OHSMs).
- The CHSM will review all incidents and corrective actions taken. The CHSM will provide a summary of serious incidents to the Board of Directors.
- The CHSM will communicate learnings from incidents and corrective actions taken to all personnel, through quarterly communications.
- The CHSM will periodically review and evaluate the effectiveness of this procedure.

### 3.2 Office Manager (OM)

- The OM will designate the individual to serve as the OHSM responsibility for ensuring that requirements in this procedure are met.
- The OM will ensure that sufficient resources are allocated to fulfill the requirements of this procedure.
- The OM will conduct final review of all incident reports prepared under this procedure.

### 3.3 Office Health and Safety Manager (OHSM)

- It is the responsibility of the OHSM to review draft incident reports and assist the OM in finalizing reports of all accidents, illnesses and incidents related to work activity, and to assist the SHSO when necessary.

- The OHSM may not approve a site-specific HASP unless the HASP includes incident reporting procedures and forms.
- The OHSM will suggest and implement corrective actions to prevent the same type of incident from re-occurring.
- The OHSM will keep all incident reports, corrective action taken, and follow-up forms on file. The OHSM will provide copies of all final reports and forms to the CHSM within one week of the incident. If a serious incident occurs, the CHSM will be notified as soon as possible.
- The occurrence of a serious incident will trigger an EHS audit by the OHSM.

### 3.4 Project Manager (PM)

- It shall be the PM's responsibility to promptly correct any deficiencies that were determined to cause or contribute to the incident investigated.
- If a site-specific HASP is not utilized, the PM must ensure that field personnel have copies of the Roux Accident Reporting and Investigation Forms.
- The PM has the responsibility of ensuring that the SHSO and other field personnel understand the need for timely incident reporting.
- In the event of an incident, the PM will determine the root cause of the incident with the assistance of the SHSO and/or OHSM. The PM should provide input as to corrective preventative measures.

### 3.5 Site Health and Safety Officer (SHSO)

- The SHSO shall provide the details of the incident to the OHSM, PM and OM. The OM or his delegate will provide additional notifications, such as, in the event of a work-related motor vehicle accident, to include Roux Legal.
- It is the SHSO's responsibility to immediately notify the OHSM and the PM when any incident occurs. Such notification should take place immediately following the completion of any emergency actions required by the HASP.
- The SHSO should provide input as to corrective preventative measures.
- The SHSO must ensure that corrective actions proposed by the OHSM or OM are carried out.

### 3.6 All Personnel

- All personnel are responsible for reporting and describing the details of any incident in which they are involved to the SHSO and PM. Such notification should take place immediately following the completion of any emergency actions required by the HASP and after the loss and before the scene is disturbed or vehicles moved.

## 4. PROCEDURE

### 4.1 Incident Investigation

On receiving a report of incident or near loss occurrence from a Roux employee, the SHSO or OHSM shall immediately investigate the circumstances and shall make appropriate recommendations to prevent recurrence. The Incident Report form can be found in **Appendix A**, and Near Loss form can be found in **Appendix B**. The OHSM may participate in the investigation of more serious accidents and incidents that occur on-site. The Corporate Health and Safety Manager (CHSM) shall also be immediately notified by telephone on occurrence of a serious accident or incident. At the CHSM's discretion, he may also participate in the investigation.

#### **4.2 Incident Report**

Details of the incident shall be documented using the Accident Report and Investigation Forms (Appendix A) within twenty-four (24) hours of the incident and shall be distributed to the SHSO, the OHSM, PM, OM and the CHSM. The CHSM will update OSHA Forms 301 and the 300 log when necessary.



Appendix A – Accident Report and Investigation Form

- Roux Environmental Engineering and Geology, D.P.C.  
 Roux Associates, Inc.  Remedial Engineering, P.C.

ACCIDENT REPORT

Brian Hobbs, Corporate Health and Safety Manager  
 Cell: (631) 807-0193; Office: (631) 630-2416

PART 1: ADMINISTRATIVE INFORMATION																																																													
<b>Project #:</b> _____ <b>Project Name:</b> _____ <b>Project Location</b> (street address/city/state): _____ _____ <b>Client Corporate Name / Contact / Address / Phone #:</b> _____ _____ _____ _____ _____	<b>Immediate Verbal Notifications Given To:</b>  Corporate Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Project Principal <input type="checkbox"/> Yes <input type="checkbox"/> No Project Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Client Contact <input type="checkbox"/> Yes <input type="checkbox"/> No	<b>REPORT STATUS (time due):</b> <input type="checkbox"/> Initial (24 hr) <input type="checkbox"/> Final (5-10 days) Date: _____ Date: _____ <b>Accident Report Delivered To:</b> Corporate Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Project Principal <input type="checkbox"/> Yes <input type="checkbox"/> No Project Manager <input type="checkbox"/> Yes <input type="checkbox"/> No <b>REPORT TYPE:</b> <input type="checkbox"/> Loss <input type="checkbox"/> Near Loss Estimated Costs: \$ _____																																																											
<b>OSHA CASE # Assigned by Corporate Health &amp; Safety if Applicable:</b> _____	<b>Corporate Health &amp; Safety Confirmed Final Accident Report</b> <input type="checkbox"/> Yes <input type="checkbox"/> No																																																												
<b>DATE OF INCIDENT:</b> _____	<b>TIME INCIDENT OCCURRED:</b> _____ <input type="checkbox"/> AM <input type="checkbox"/> PM	<b>INCIDENT LOCATION</b> – City, State, and Country (If outside U.S.A.) _____																																																											
<b>INCIDENT TYPES: (Select most appropriate if Loss occurred.)</b> From lists below, please select the option that best categories the incident. When selecting an injury or illness, also indicate the severity level.																																																													
<table style="width:100%; border: none;"> <tr> <td style="width: 33%; border: none;"><input type="checkbox"/> <b>INJURY</b></td> <td style="width: 33%; border: none;"><input type="checkbox"/> <b>ILLNESS</b></td> <td style="width: 34%; border: none;"><b>OTHER INCIDENT TYPES</b></td> </tr> <tr> <td colspan="3" style="border: none;">-----Severity Level-----</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Fatality</td> <td style="border: none;"><input type="checkbox"/> First Aid</td> <td style="border: none;"><input type="checkbox"/> Spill / Release</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Restricted Work</td> <td style="border: none;"><input type="checkbox"/> Lost Time</td> <td style="border: none;">Material involved: _____</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Medical Treatment</td> <td style="border: none;">Quantity (U.S. Gallons): _____</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Misdirected Waste <input type="checkbox"/> Consent Order <input type="checkbox"/> NOV</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Property Damage <input type="checkbox"/> Exceedance</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Motor Vehicle <input type="checkbox"/> Fine / Penalty</td> </tr> </table>					<input type="checkbox"/> <b>INJURY</b>	<input type="checkbox"/> <b>ILLNESS</b>	<b>OTHER INCIDENT TYPES</b>	-----Severity Level-----			<input type="checkbox"/> Fatality	<input type="checkbox"/> First Aid	<input type="checkbox"/> Spill / Release	<input type="checkbox"/> Restricted Work	<input type="checkbox"/> Lost Time	Material involved: _____		<input type="checkbox"/> Medical Treatment	Quantity (U.S. Gallons): _____			<input type="checkbox"/> Misdirected Waste <input type="checkbox"/> Consent Order <input type="checkbox"/> NOV			<input type="checkbox"/> Property Damage <input type="checkbox"/> Exceedance			<input type="checkbox"/> Motor Vehicle <input type="checkbox"/> Fine / Penalty																																	
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Driving</td> <td style="border: none;"><input type="checkbox"/> Cold/Heat Stress</td> <td style="border: none;"><input type="checkbox"/> Abdomen</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Excavation</td> <td style="border: none;"><input type="checkbox"/> Inflammation</td> <td style="border: none;"><input type="checkbox"/> Groin</td> </tr> <tr> <td style="border: none;">/ Trenching</td> <td style="border: none;"><input type="checkbox"/> Laceration</td> <td style="border: none;"><input type="checkbox"/> Back</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Gauging</td> <td style="border: none;"><input type="checkbox"/> Occupational Illness</td> <td style="border: none;"><input type="checkbox"/> Shoulder</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> O&amp;M</td> <td style="border: none;"><input type="checkbox"/> Puncture</td> <td style="border: none;"><input type="checkbox"/> Arm</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Other Soil Work</td> <td style="border: none;"><input type="checkbox"/> Rash</td> <td style="border: none;"><input type="checkbox"/> Wrist</td> </tr> <tr> <td style="border: none;">(e.g. Compaction)</td> <td style="border: none;"><input type="checkbox"/> Repetitive Motion</td> <td style="border: none;"><input type="checkbox"/> Hand/Fingers</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Sampling</td> <td style="border: none;"><input type="checkbox"/> Sprain/Strain</td> <td style="border: none;"><input type="checkbox"/> Eye</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Site Walk/Inspection</td> <td style="border: none;"><input type="checkbox"/> Other</td> <td style="border: none;"><input type="checkbox"/> Head</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Subsurface Clearance</td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Face</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Trucking</td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Leg</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Waste Mgmt.</td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Knee</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Work Area Prep.</td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Ankle</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Other</td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Foot/Toes</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: none;"><input type="checkbox"/> Other</td> </tr> </table>					<b>ACTIVITY TYPE (Check most appropriate one.)</b>	<b>INJURY TYPE (Check all applicable.)</b>	<b>BODY PART AFFECTED (Check all applicable.)</b>	<input type="checkbox"/> 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Sampling	<input type="checkbox"/> Sprain/Strain	<input type="checkbox"/> Eye	<input type="checkbox"/> Site Walk/Inspection	<input type="checkbox"/> Other	<input type="checkbox"/> Head	<input type="checkbox"/> Subsurface Clearance		<input type="checkbox"/> Face	<input type="checkbox"/> Trucking		<input type="checkbox"/> Leg	<input type="checkbox"/> Waste Mgmt.		<input type="checkbox"/> Knee	<input type="checkbox"/> Work Area Prep.		<input type="checkbox"/> Ankle	<input type="checkbox"/> Other		<input type="checkbox"/> Foot/Toes			<input type="checkbox"/> Other
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		<input type="checkbox"/> Other																																																											
<b>I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)</b>																																																													
Name/Phone # of Each Person Directly/Indirectly Involved in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:																																																									
1)																																																													
2)																																																													



**II. PERSONS INJURED IN INCIDENT** (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Injured in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:	Description of Injury:
1)					
2)					

**III. PROPERTY DAMAGED IN INCIDENT** (Attach additional information as necessary/applicable.)

Property Damaged:	Property Location:	Owner Name, Address & Phone #:	Description of Damage:	Estimated Cost:
1)				
2)				\$

**IV. WITNESSES TO INCIDENT** (Attach additional information as necessary/applicable.)

Witness Name:	Address:	Phone #:
1)		
2)		

**PART 2: WHAT HAPPENED AND INCIDENT DETAILS**

**PROVIDE FACTUAL DESCRIPTION OF INCIDENT** (e.g., describe loss/near loss, injury, response / treatment).

**I. AUTHORITIES/GOVERNMENTAL AGENCIES NOTIFIED** (Attach additional information as necessary/applicable.)

Authority/Agency Notified:	Name/Phone #/Fax # of Person Notified:	Address of Person Notified:	Date & Time of Notification:	Exact Information Reported/Provided:

**II. PUBLIC RESPONSES TO INCIDENT (if applicable)**

Response/Inquiry By: (check one)	Entity Name:	Name/Phone # of Respondent/ Inquirer:	Address of Entity/Person:	Date & Time of Response/Inquiry:
<input type="checkbox"/> Newspaper <input type="checkbox"/> Television <input type="checkbox"/> Community Group <input type="checkbox"/> Neighbors <input type="checkbox"/> Other				

Describe Response/Inquiry:

Roux/Remedial Response:

(Check all that apply.) (Attach photos, drawings, etc. to help illustrate the incident.)

**ATTACHED INFORMATION:**     Photo     Sketches     Vehicle Acord Form     Police Report     Other

<b>Name(s) of person(s) who prepared Initial and Final Report:</b>	<b>Title(s):</b>	<b>Phone number(s):</b>
--	------------------	-------------------------



**PART 3: INVESTIGATION TEAM ANALYSIS**

**Date Investigation Started (MM/DD/YYYY):**

Factors, Root Causes, and Solution (FRCS): Complete FRCS form and answer all 7 factor questions. If answering NO to Factors 1 – 4 identify root cause(s) and explain why QIs occurred. If answering YES to Factors 5 – 7 circle the root cause(s). Transfer the solutions guidance that addresses each root cause from the FRCS form to this form. Attach your completed FRCS Worksheet. If Factors 1-7 do not apply to the incident, write "External Cause" in the Factor column below and leave the remaining fields blank.

**DESCRIPTION OF UNDESIRABLE BEHAVIOR/CONDITION**

1.

2.

**FACTOR(S) AND SOLUTION(S): HOW TO REDUCE POSSIBILITY OF INCIDENT RECURRING**

Selection of factors and solutions reflects the analysis of investigation team and is not meant to be a legally binding conclusion as to the Root Cause and/or solution.

CAUSAL FACTOR/ BEHAVIOR/ CONDITION	ROOT CAUSE	SOLUTION(S) [Must Match Root Cause(s)]	PERSON RESPONSIBLE	AGREED DUE DATE	ACTUAL COMPLETION DATE

**INVESTIGATION TEAM:**

PRINT NAME	JOB POSITION	DATE	SIGNATURE

**QUALITY REVIEW** Correct root cause(s) identified? Do root cause(s) and solution(s) match? Are solution(s) feasible / maintainable?

Name:

Job Title:

**PART 4: Date Solutions were Implemented & Validated (Were Solutions Effective?)**

Date	Solution	Verifier / Validator Name and Job Title	Details (of I & V performed)



Appendix B – Near Loss Form

HEALTH & SAFETY NEAR LOSS ROUX REPORT FORM

- Roux Environmental Engineering and Geology, D.P.C.
- Roux Associates, Inc.     Remedial Engineering, P.C.

(Check applicable company name)

PART 1: ADMINISTRATIVE INFORMATION			
Office: <input type="checkbox"/> New York <input type="checkbox"/> Massachusetts <input type="checkbox"/> New Jersey <input type="checkbox"/> Illinois <input type="checkbox"/> CA - Los Angeles <input type="checkbox"/> CA - Oakland			
Project Manager:		Project Principal:	
Project Name:		Project Location:	
PART 2: NEAR LOSS INCIDENT DETAILS			
Date\Time Occurred (MM/DD/YYYY HH:MM):		Date\Time Submitted (MM/DD/YYYY HH:MM):	
NEAR LOSS INCIDENT TYPE - What could have happened? - Select all that apply (1-7)			
1. <input type="checkbox"/> Fire / Explosion	3. <input type="checkbox"/> Security (e.g., theft, trespassing, vandalism)	4. <input type="checkbox"/> Environmental (Spill, permit exceedance, etc.)	6. <input type="checkbox"/> Property/Equipment Damage
2. <input type="checkbox"/> Injury / Illness		5. <input type="checkbox"/> Transportation of personnel (vehicle accident)	7. <input type="checkbox"/> Business Interruption
Event Leading to Potential Injury/Illness:			
Job Task*:		Equipment Involved*:	
WHAT HAPPENED? Do not include individuals' names. Ensure photos, sketches, etc. are not personally identifiable unless written consent has been obtained.			
Summary (1-2 sentences. Provide brief description of the incident. Provide facts only, no speculation or opinion):			
Incident Details (Brief factual details of what, where, when; include photos, sketches, etc. as attachments):			
Immediate Corrective Actions Taken:			
SERIOUS INJURY OR FATALITY (SIF):      IF AN ACTUAL SIF, USE EXISTING ROUX ACCIDENT REPORTING FORM			
Could this have resulted in a SIF? <input type="checkbox"/> Yes <input type="checkbox"/> No			
A potential SIF is defined as likely to have caused an injury resulting in significant physical body damage with probable long term and/or life altering complications.			
INCIDENT INVOLVED:			
Roux Employee: <input type="checkbox"/> Yes <input type="checkbox"/> No		Subcontractor Company Name:	
INVESTIGATION TEAM			
NAME	JOB TITLE	NAME	JOB TITLE

**PART 3: INCIDENT INVESTIGATION FINDINGS AND REPORT QUALITY REVIEW**

Date Investigation Started (mm/dd/yyyy):

Factors, Root Causes, and Solution (FRCS): Complete FRCS form and answer all 7 factor questions. If answering NO to Factors 1 – 4 identify root cause(s) and explain why QIs occurred. If answering YES to Factors 5 – 7 circle the root cause(s). Transfer the solutions guidance that addresses each root cause from the FRCS form to this form. Attach your completed FRCS Worksheet. If Factors 1-7 do not apply to the incident, write “External Cause” in the Factor column below and leave the remaining fields blank. **Do not include individuals' names.**

**DESCRIPTION OF UNDESIRABLE BEHAVIOR/CONDITION**

1.

2.

**FACTOR(S) AND SOLUTION(S): HOW TO REDUCE POSSIBILITY OF INCIDENT RECURRING**

Selection of factors and solutions reflects the analysis of investigation team and is not meant to be a legally binding conclusion as to the Root Cause and/or solution.

Behavior / Condition	Root Cause	Solution(s) (Must Match Root Cause)	Person Responsible for Completion	Completion Target Date	Completion Actual Date

**QUALITY REVIEW** Correct root cause(s) identified? Do root cause(s) and solution(s) match? Are solution(s) feasible / maintainable?

Name:

Job Title:

**PART 4: Date Solutions were Implemented & Validated (Were Solutions Effective?)**

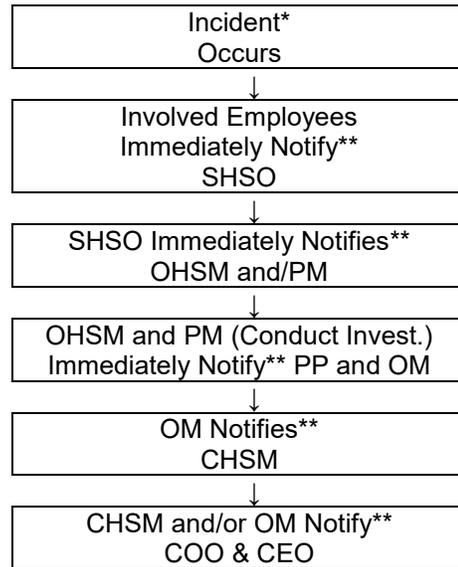
Date	Solution	Verifier / Validator Name and Job Title	Details (of I & V performed)

**\*JOB TASK - Select the most appropriate one** (primary job associated with incident-related work activity, avoid "Other" if possible)

- |                         |                                      |                           |
|-------------------------|--------------------------------------|---------------------------|
| 1. CAMP                 | 7. O&M                               | 12. Trucking              |
| 2. Construction         | 8. Other Soil Work (e.g. Compaction) | 13. Waste Management      |
| 3. Drilling             | 9. Sampling                          | 14. Work Area Preparation |
| 4. Driving              | 10. Site Walk/ Inspection            | 15. Other                 |
| 5. Excavation/Trenching | 11. Subsurface Clearance             |                           |
| 6. Gauging              |                                      |                           |

**\*EQUIPMENT INVOLVED THAT CONTRIBUTED TO H&S NEAR LOSS - Select all that apply**

- |                                |                             |                                    |  |                                    |
|--------------------------------|-----------------------------|------------------------------------|--|------------------------------------|
| 1. Air Stripper                | 25. Fire Extinguisher       | 51. Maintenance Tool, General      | 77. Safety Shoes / Boots               | 98. Vapor Extraction System        |
| 2. API Separator               | 26. Forklift                | 52. Manifold                       | 78. Safety Vest / Clothing             | 99. Vapor-Phase Treatment System   |
| 3. Automobile                  | 27. Front End Loader        | 53. Manlift/Basket/Cherry Picker   | 79. Rope                               | 100. Other System, Type: _____     |
| 4. Boom Material               | 28. Grader                  | 54. Motor, Electric                | 80. Bailer                             | 101. Surge Tank                    |
| 5. Bulldozer                   | 29. Hammer                  | 55. Oxidizer                       | 81. Geoprobe                           | 102. Underground Tank              |
| 6. Cable                       | 30. Knife                   | 56. Pallet                         | 82. Hand Auger                         | 103. Telemetry System              |
| 7. Carbon Drum / Vessel        | 31. Non-Powered Equipment   | 57. Piping                         | 83. PID                                | 104. Testing Devices               |
| 8. Chain Block                 | 32. Powered Equipment       | 58. Piping, Hose                   | 84. Multi-Gas Meter                    | 105. Tractor Trailer               |
| 9. Compressor, Air             | 33. Drill                   | 59. Piping, Injection/Mixing Point | 85. Sample Container                   | 106. Truck, Flatbed                |
| 10. Control Panel (local)      | 34. Grinder                 | 60. Hydrojet                       | 86. Split-Spoon Sampler                | 107. Truck, Pickup                 |
| 11. Crane (mobile)             | 35. Hydraulic Torque Wrench | 61. Centrifugal Pump               | 87. Sling                              | 108. Truck, Tank Truck             |
| 12. Drill Rig                  | 36. Powered Saw             | 62. Diaphragm Pump                 | 88. Snow Blower                        | 109. Truck, Vacuum                 |
| 13. Drilling Equipment, Vacuum | 37. Impact Wrench           | 63. Reciprocating Pump             | 89. Snow Plow                          | 110. Safety Valve                  |
| 14. Drum, Vertical             | 38. Saw                     | 64. Regenerative Pump              | 90. Space Heater                       | 111. Block Valve                   |
| 15. Dump Truck                 | 39. Screwdriver             | 65. Rotary Pump                    | 91. Air Sparging System                | 112. Extraction Well               |
| 16. Electric Heater            | 40. Shears                  | 66. Transfer Pump                  | 92. Carbon Treatment System            | 113. Monitoring Well               |
| 17. Electrical Power Supply    | 41. Shovel                  | 67. Submersible Pump               | 93. Chemical Oxidation System          | 114. Recovery Well                 |
| 18. Engine, Combustion         | 42. Snip                    | 68. Face Shield                    | 94. Dual Phase Product Recovery System | 115. Winch                         |
| 19. Equipment Safety Grounding | 43. Wrench                  | 69. Fall Protection                | 95. Groundwater Pump and Treat System  | 116. Wire Rope                     |
| 20. Excavator / Power Shovel   | 44. Hoist                   | 70. Gloves                         | 96. POET System                        | 117. No Equipment Involved         |
| 21. Exclusion Zone Equipment   | 45, Hook/Clamp/Buckle, etc. | 71. Hard Hat / Helmet              | 97. Shed or Trailer                    | 118. MPT – Traffic Control Devices |
| 22 Fan / Blower                | 46. Jack                    | 72. Hearing Protection             |  | 118. Not in List (describe): _____ |
| 23 Fencing                     | 47. Ladder, Extension       | 73. Respiratory PPE (Chemical)     |  |                                    |
| 24 Filter                      | 48. Ladder, Platform        | 74. Respiratory PPE (Particulate)  |  |                                    |
|                                | 49. Ladder, Step            | 75. Safety Glasses                 |  |                                    |
|                                | 50. Lock Out / Tag Out      | 76. Safety Goggles                 |  |                                    |

**Appendix C – Injury Illness Reporting Flow Chart****Health & Safety Near/Loss – Loss (Incident)\*  
Notification Flow Chart**

\* Incident – any work or site-related occurrence that resulted in, or could potentially have resulted in, the need for medical care or in property damage (i.e., all injuries or illnesses, exposure to toxic materials or any other significant occurrence resulting in property damage or in a "near loss")

\*\* Verbal Notification

Initial Incident Report (written) to SHSO, OHSM, OM and CHSM within 24 hours  
Follow-up Report within one week.



- Roux Environmental Engineering and Geology, D.P.C.
- Roux Associates, Inc.     Remedial Engineering, P.C.

ACCIDENT REPORT

Brian Hobbs, Corporate Health and Safety Manager  
Cell: (631) 807-0193; Office: (631) 630-2416

**PART 1: ADMINISTRATIVE INFORMATION**

<b>Project #:</b> _____ <b>Project Name:</b> _____ <b>Project Location</b> (street address/city/state): _____  <b>Client Corporate Name / Contact / Address / Phone #:</b> _____ _____ _____ _____	<b>Immediate Verbal Notifications Given To:</b>  Corporate Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Project Principal <input type="checkbox"/> Yes <input type="checkbox"/> No Project Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Client Contact <input type="checkbox"/> Yes <input type="checkbox"/> No	<b>REPORT STATUS (time due):</b> <input type="checkbox"/> Initial (24 hr) <input type="checkbox"/> Final (5-10 days) Date: _____        Date: _____  <b>Accident Report Delivered To:</b> Corporate Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Project Principal <input type="checkbox"/> Yes <input type="checkbox"/> No Project Manager <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>OSHA CASE # Assigned by Corporate Health &amp; Safety if Applicable:</b> _____		
<b>DATE OF INCIDENT:</b> _____		<b>TIME INCIDENT OCCURRED:</b> _____ <input type="checkbox"/> AM <input type="checkbox"/> PM
<b>INCIDENT LOCATION – City, State, and Country (If outside U.S.A.):</b> _____		
<b>REPORT TYPE:</b> <input type="checkbox"/> Loss <input type="checkbox"/> Near Loss        Estimated Costs: \$ _____		

**INCIDENT TYPES: (Select most appropriate if Loss occurred.)**  
From lists below, please select the option that best categories the incident. When selecting an injury or illness, also indicate the severity level.

<input type="checkbox"/> <b>INJURY</b> -----Severity Level----- <input type="checkbox"/> Fatality <input type="checkbox"/> First Aid <input type="checkbox"/> Medical <input type="checkbox"/> Restricted Work <input type="checkbox"/> Lost Time                    Treatment	<input type="checkbox"/> <b>ILLNESS</b>  <input type="checkbox"/> Spill / Release Material involved: _____ Quantity (U.S. Gallons): _____	<input type="checkbox"/> <b>OTHER INCIDENT TYPES</b> <input type="checkbox"/> Misdirected Waste <input type="checkbox"/> Consent Order <input type="checkbox"/> NOV <input type="checkbox"/> Property Damage <input type="checkbox"/> Exceedance <input type="checkbox"/> Motor Vehicle <input type="checkbox"/> Fine / Penalty
---	---	--

<b>ACTIVITY TYPE (Check most appropriate one.)</b> <input type="checkbox"/> CAMP <input type="checkbox"/> Gauging <input type="checkbox"/> Subsurface <input type="checkbox"/> Construction <input type="checkbox"/> O&M                        Clearance <input type="checkbox"/> Drilling <input type="checkbox"/> Other Soil Work <input type="checkbox"/> Trucking <input type="checkbox"/> Driving                (e.g. Compaction) <input type="checkbox"/> Waste Mgmt. <input type="checkbox"/> Excavation <input type="checkbox"/> Sampling <input type="checkbox"/> Work Area Prep. / Trenching <input type="checkbox"/> Site Walk/Inspection <input type="checkbox"/> Other	<b>INJURY TYPE (Check all applicable.)</b> <input type="checkbox"/> Abrasion <input type="checkbox"/> Occupational Illness <input type="checkbox"/> Amputation <input type="checkbox"/> Puncture <input type="checkbox"/> Burn <input type="checkbox"/> Rash <input type="checkbox"/> Cold/Heat Stress <input type="checkbox"/> Repetitive Motion <input type="checkbox"/> Inflammation <input type="checkbox"/> Sprain/Strain <input type="checkbox"/> Laceration <input type="checkbox"/> Other	<b>BODY PART AFFECTED (Check all applicable.)</b> <input type="checkbox"/> Respiratory <input type="checkbox"/> Shoulder <input type="checkbox"/> Face <input type="checkbox"/> Neck <input type="checkbox"/> Arm <input type="checkbox"/> Leg <input type="checkbox"/> Chest <input type="checkbox"/> Wrist <input type="checkbox"/> Knee <input type="checkbox"/> Abdomen <input type="checkbox"/> Hand/Fingers <input type="checkbox"/> Ankle <input type="checkbox"/> Groin <input type="checkbox"/> Eye <input type="checkbox"/> Foot/Toes <input type="checkbox"/> Back <input type="checkbox"/> Head <input type="checkbox"/> Other
---	---	--

<b>I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)</b>				
Name/Phone # of Each Person Directly/Indirectly Involved in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:
1)				
2)				



<b>II. PERSONS INJURED IN INCIDENT</b> (Attach additional information as necessary/applicable.)					
Name/Phone # of Each Person Injured in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #:	As applicable, Supervisor Name; and Phone #:	Description of Injury:
1)					
2)					

<b>III. PROPERTY DAMAGED IN INCIDENT</b> (Attach additional information as necessary/applicable.)				
Property Damaged:	Property Location:	Owner Name, Address & Phone #:	Description of Damage:	Estimated Cost:
1)				
2)				\$

<b>IV. WITNESSES TO INCIDENT</b> (Attach additional information as necessary/applicable.)		
Witness Name:	Address:	Phone #:
1)		
2)		

**PART 2: WHAT HAPPENED AND INCIDENT DETAILS**

**PROVIDE FACTUAL DESCRIPTION OF INCIDENT** (e.g., describe loss/near loss, injury, response / treatment).

<b>I. AUTHORITIES/GOVERNMENTAL AGENCIES NOTIFIED</b> (Attach additional information as necessary/applicable.)				
Authority/Agency Notified:	Name/Phone #/Fax # of Person Notified:	Address of Person Notified:	Date & Time of Notification:	Exact Information Reported/Provided:

<b>II. PUBLIC RESPONSES TO INCIDENT (if applicable)</b>				
Response/Inquiry By: (check one)	Entity Name:	Name/Phone # of Respondent/ Inquirer:	Address of Entity/Person:	Date & Time of Response/Inquiry:
<input type="checkbox"/> Newspaper <input type="checkbox"/> Television <input type="checkbox"/> Community Group <input type="checkbox"/> Neighbors <input type="checkbox"/> Other				
Describe Response/Inquiry:				
Roux/Remedial Response:				



(Check all that apply.) (Attach photos, drawings, etc. to help illustrate the incident.)

**ATTACHED INFORMATION:** Photo Sketches Vehicle Acord Form Police Report Other

Name(s) of person(s) who prepared Initial and Final Report: \_\_\_\_\_ Title(s): \_\_\_\_\_ Phone number(s): \_\_\_\_\_

**PART 3: INVESTIGATION TEAM ANALYSIS**

**Date Investigation Started (MM/DD/YYYY):** \_\_\_\_\_

Factors, Root Causes, and Solution (FRCS): Complete FRCS form and answer all 7 factor questions. If answering NO to Factors 1 – 4 identify root cause(s) and explain why QIs) occurred. If answering YES to Factors 5 – 7 circle the root cause(s). Transfer the solutions guidance that addresses each root cause from the FRCS form to this form. Attach your completed FRCS Worksheet. If Factors 1-7 do not apply to the incident, write "External Cause" in the Factor column below and leave the remaining fields blank.

**DESCRIPTION OF UNDESIRABLE BEHAVIOR/CONDITION**

- \_\_\_\_\_
- \_\_\_\_\_

**FACTOR(S) AND SOLUTION(S): HOW TO REDUCE POSSIBILITY OF INCIDENT RECURRING**  
Selection of factors and solutions reflects the analysis of investigation team and is not meant to be a legally binding conclusion as to the Root Cause and/or solution.

CAUSAL FACTOR/ BEHAVIOR/ CONDITION	ROOT CAUSE	SOLUTION(S) [Must Match Root Cause(s)]	PERSON RESPONSIBLE	AGREED DUE DATE	ACTUAL COMPLETION DATE

**INVESTIGATION TEAM:**

PRINT NAME	JOB POSITION	DATE	SIGNATURE

**QUALITY REVIEW** Correct root cause(s) identified? Do root cause(s) and solution(s) match? Are solution(s) feasible / maintainable?

Name: \_\_\_\_\_ Job Title: \_\_\_\_\_

**PART 4: Date Solutions were Implemented & Validated (Were Solutions Effective?)**

Date	Solution	Verifier / Validator Name and Job Title	Details (of I & V performed)

**Site-Specific Health and Safety Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

---

**APPENDIX E**

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.

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**APPENDIX F**

New York State Department of Health (NYSDOH)  
Generic Community Air Monitoring Program (CAMP)

## **New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP)**

### **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., offsite receptors including residences and businesses and onsite 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 offsite 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**

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.

**Site-Specific Health and Safety Plan**  
***148 and 156 Nagle Avenue, Manhattan, New York***

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**APPENDIX G**

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

## 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 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:** \_\_\_\_\_

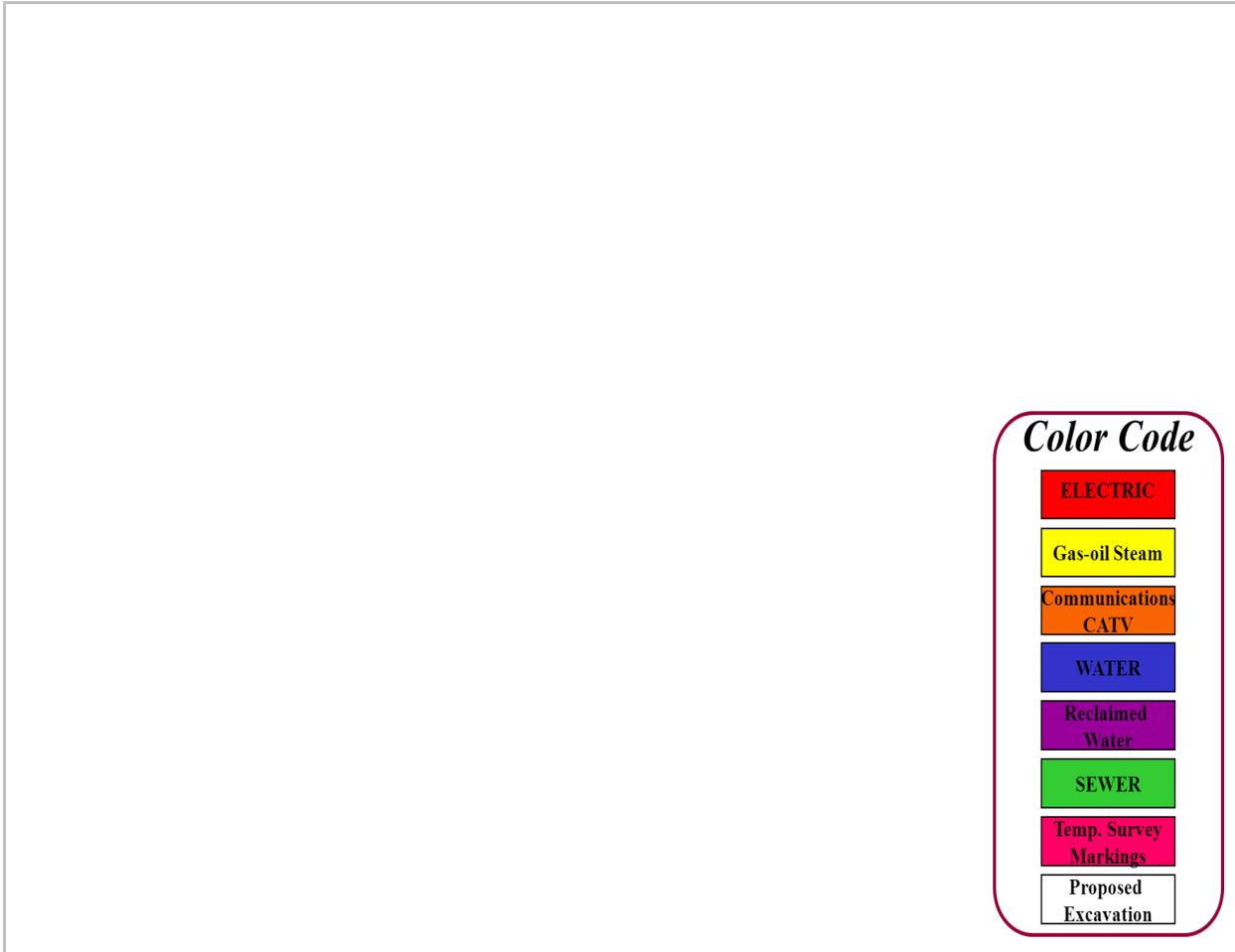
**Date:** \_\_\_\_\_

**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

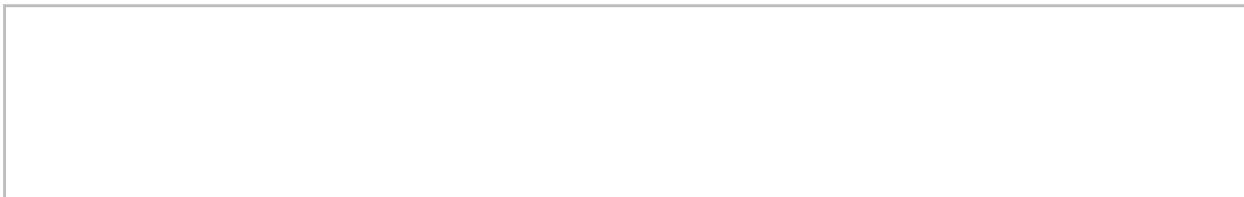
Site Sketch Showing Utilities:



***Color Code***

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

Other Comments / Findings:



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

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

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**

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## 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.

**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**APPENDIX F**

Community Air Monitoring Plan



# Community Air Monitoring Plan

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148 Nagle Street  
Manhattan, New York  
NYSDEC BCP Site No. C231124

June 17, 2022

Prepared for:

**Dyckman Crestview Realty, LLC**  
13 Harding Terrace  
Morristown, New Jersey 07960

Prepared by:

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

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## Table

1. Action Limit Summary for VOCs and Particulates

## Appendix

- A. Action Limit Report

# 1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), on behalf of Dyckman Crestview Realty, LLC (Owner), has developed a project specific Community Air Monitoring Plan (CAMP) to implement real time monitoring during remedial construction occurring at 148 Nagle, Manhattan, New York (Site).

The monitoring program will be implemented at all times during which earth disturbance activities are occurring. The CAMP is designed to provide a measure of protection for the downwind community and on-Site workers not directly involved with the subject work activities from potential airborne contaminant releases as a direct result of remedial and construction activities. This plan is consistent with the New York State Department of Health's (NYSDOH) Generic Community Air Monitoring Plan guidance document.

The specifics of the CAMP are presented in the following four (4) sections:

- 1.1 VOC Monitoring Approach
- 1.2 Particulate Monitoring Approach
- 1.3 Meteorological Monitoring Approach
- 1.4 Available Suppression Techniques

## 1.1 VOC Monitoring Approach

Total VOC concentrations in air will be monitored continuously at a location downwind of the excavation activities during all ground intrusive activities. An upwind monitoring station will be set up adjacent to where the excavation is occurring. The VOC monitoring equipment will be located at temporary monitoring stations established daily based on Site logistics and weather conditions. The monitoring work will be conducted using MiniRAE 3000 (or equivalent) portable VOC monitors, or similar type monitors, for all VOC monitoring. The equipment will be calibrated at least once daily using isobutylene as the calibration gas. One (1) upwind and one (1) downwind monitor will be deployed each day. Each monitoring unit is equipped with an audible alarm to indicate exceedance of the action levels (as defined below and summarized in Table 1).

The equipment is capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total VOCs at the downwind perimeter of the Site 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.
- If the ambient air concentration of total VOCs at the downwind perimeter of the Site persists at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of VOCs identified, suppression techniques employed to abate emissions, and monitoring continued. After these steps, work activities can resume if the total organic vapor level at the Site perimeter is below 5 ppm over the background concentration for the 15-minute average. If levels are in excess of 25 ppm above background, identified contributing ground-intrusive activities will be halted and vapor suppression techniques will be evaluated and modified until monitoring indicates VOC levels at the Site perimeter are below 5 ppm over background. Once VOC levels are below 5 ppm at the Site perimeter, work will resume with continued monitoring.
- All 15-minute readings will be recorded and available for State Regulator (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will be recorded. If an exceedance of the action level occurs, an Action Limit Report (ALR) will be completed, identifying

the monitoring device location, the measured VOC level, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Appendix A. Additionally, the NYSDEC and NYSDOH will be notified within 24 hours of the VOC ALR generation. Daily monitoring equipment locations and meteorological conditions will also be documented on the daily CAMP Monitoring Location Plan. All documentation will be kept on file at the Site.

## **1.2 Particulate Monitoring, Response Levels and Actions**

Particulate concentrations will be monitored continuously at temporary particulate monitoring stations set up at the sidewalk at upwind and downwind locations. The particulate monitoring will 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 levels (as defined below and summarized in Table 1). Monitoring equipment will be MIE Data Ram monitors or equivalent. A minimum of one (1) upwind and one (1) downwind monitor will be deployed each day, equipped with an omni-directional sampling inlet and a PM-10 sample head. The data logging averaging period will be set to 15-minutes with time and date stamp recording. Alarm averaging will be set at 90 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) per 15-minute period. This setting will allow proactive evaluation of Site conditions prior to reaching Action Levels of 100  $\mu\text{g}/\text{m}^3$  above background. The equipment will be outfitted with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. The monitoring will be used to compare values to the following:

- If the downwind PM-10 particulate level is 100  $\mu\text{g}/\text{m}^3$  greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the Site, 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  $\mu\text{g}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the Site.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150  $\mu\text{g}/\text{m}^3$  above the upwind level, work must be stopped, a re-evaluation of activities initiated, and dust suppression techniques modified. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150  $\mu\text{g}/\text{m}^3$  of the upwind level and in preventing visible dust migration.

All 15-minute readings will be recorded and available for State Regulator (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will be recorded. If an exceedance of the action level occurs, an ALR will be completed, identifying the monitoring device location, the measured particulate concentration, the activity causing the exceedance, meteorological conditions, and the corrective actions taken, as provided in Appendix A. Daily monitoring equipment locations will also be documented on the daily CAMP Monitoring Location Plan. All documentation will be kept on file at the Site.

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

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m<sup>3</sup>, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m<sup>3</sup> or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

#### **1.4. Special Requirements for Indoor Work With Co-Located Residences or Facilities**

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above in Section 1.3 under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

#### **1.5 Meteorological Monitoring**

Wind speed (estimated) and wind direction will be approximated based on field observations of on-Site personnel. Meteorological data consisting of temperature, barometric pressure, and relative humidity will be recorded in the field book based upon publically available information from local weather stations.

#### **1.6 Available Suppression Techniques**

##### Odor Control

Due to the nature of the project, with excavation occurring, the potential for generation of nuisance odors and the need for odor control may be necessary. 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.

All necessary means will be employed to prevent on- and off-Site 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) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) use of chemical odorants in spray or misting systems; and (e) use of staff to monitor odors in surrounding neighborhoods.

## Dust Control

Due to the nature of the project, the potential for generation of nuisance dust and the need for dust control may be necessary. Dust suppression will be achieved through the use of water for wetting excavation areas, if required. Water will be available on-site at suitable supply and pressure for use in dust control.

## **1.7 Reporting**

All recorded monitoring data will be downloaded, and field logged periodically, including action limit reports (if any) and daily CAMP monitoring location plans. All records will be maintained onsite and available for NYSDEC/NYSDOH review. A summary of CAMP findings, including excursions, will be provided in the Daily and Monthly Reports. All CAMP monitoring records will be included in the overall Final Engineering Report that will be submitted to the NYSDEC and NYSDOH and will include all of the CAMP data collected, daily monitoring station location maps, and copies of the ALRs (if any). If an ALR is generated due to VOC exceedances, the NYSDEC and NYSDOH will be notified within 24 hours of the exceedance.

**TABLE**

Action Limit Summary for VOCs and Particulates

**Table 1. Action Limit Summary for VOCs and Particulates**

Contaminant	Downwind Action Levels*	Action/Response
<b>Volatile Organic Compounds (VOCs)</b> (Monitoring Via Photoionization Detector and Odor Observation)	< 5 ppm	1. Resume work with continuing monitoring.
	5 ppm < level < 25 ppm	1. Work activities must be temporarily halted, source vapors must be identified, suppression techniques employed to abate emissions and monitoring continued. 2. After these steps, if VOC levels (200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or structure, whichever is less) is below 5 ppm over background, resume work.
	> 25 ppm	1. Identified contributing ground intrusive activities must be halted and vapor suppression techniques must be evaluated and modified until monitoring indicates VOC levels below the action level. 2. After these steps, if VOC levels (half the distance to the nearest potential receptor or structure) are below 5 ppm over background, resume work.
<b>Particulates</b> (Monitoring Via Particulate Meter and Observation)	< 100 ug/m <sup>3</sup>	1. If dust is observed leaving the work area, then dust control techniques must be implemented or additional controls used.
	100 ug/m <sup>3</sup> < level < 150 ug/m <sup>3</sup>	1. Employ dust suppression techniques. 2. Work may continue with dust suppression techniques provided that downwind PM-10 particulate concentration do not exceed 150 ug/m <sup>3</sup> above the upwind level and provided that no visible dust is migrating from the work area.
	> 150 ug/m <sup>3</sup>	1. STOP work 2. Re-evaluate activities, modify dust suppression techniques. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m <sup>3</sup> of the upwind level and in preventing visible dust migration.

\* Instantaneous readings above background. Particulate readings are based on the respirable (PM-10) fraction. Background readings are taken at upwind locations relative to Work Areas or Exclusion Zones.

Action Limit Report

# ACTION LIMIT REPORT

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148 and 156 Nagle Avenue, Manhattan, NY

**Project Location:**

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

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

Contaminant: PM-10: \_\_\_\_\_ VOC: \_\_\_\_\_

Wind Speed: \_\_\_\_\_ Wind Direction: \_\_\_\_\_

Temperature: \_\_\_\_\_ Barometric Pressure: \_\_\_\_\_

---

**DOWNWIND DATA**

Monitor ID #: \_\_\_\_\_ Location: \_\_\_\_\_ Level Reported: \_\_\_\_\_

Monitor ID#: \_\_\_\_\_ Location: \_\_\_\_\_ Level Reported: \_\_\_\_\_

---

**UPWIND DATA**

Monitor ID #: \_\_\_\_\_ Location: \_\_\_\_\_ Level Reported: \_\_\_\_\_

Monitor ID#: \_\_\_\_\_ Location: \_\_\_\_\_ Level Reported: \_\_\_\_\_

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**BACKGROUND CORRECTED LEVELS**

Monitor ID #: \_\_\_\_\_ Location: \_\_\_\_\_ Level Reported: \_\_\_\_\_

Monitor ID#: \_\_\_\_\_ Location: \_\_\_\_\_ Level Reported: \_\_\_\_\_

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**ACTIVITY DESCRIPTION**

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**CORRECTIVE ACTION TAKEN**

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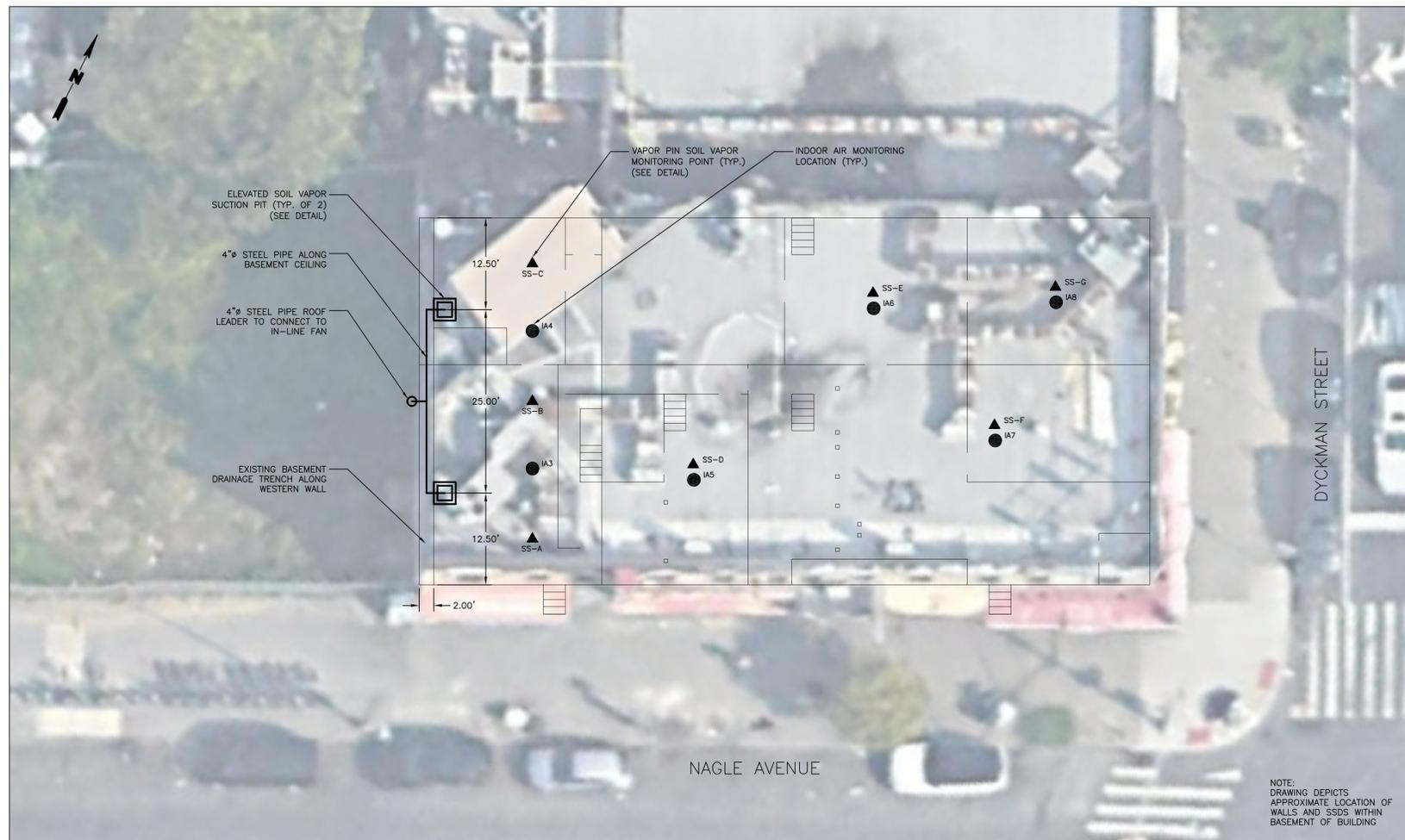
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**Interim Remedial Measure Work Plan  
148 and 156 Nagle Avenue, Manhattan, New York**

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**DRAWING**

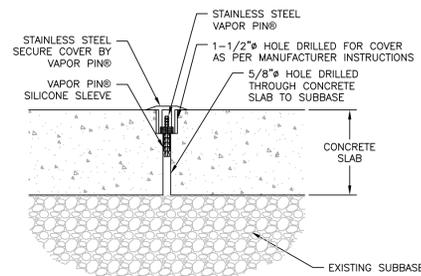
1. Conceptual Sub-Slab Depressurization System Plan and Details



**SUB-SLAB DEPRESSURIZATION SYSTEM**

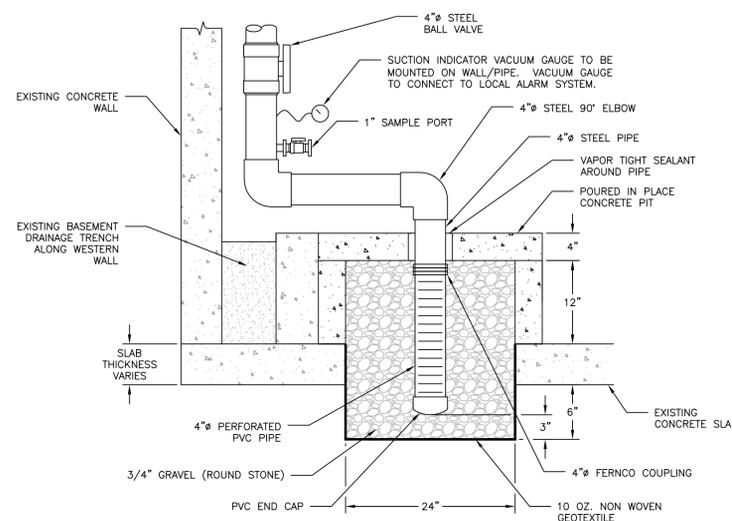
SCALE: 1" = 10'

NOTE: DRAWING DEPICTS APPROXIMATE LOCATION OF WALLS AND SSDS WITHIN BASEMENT OF BUILDING



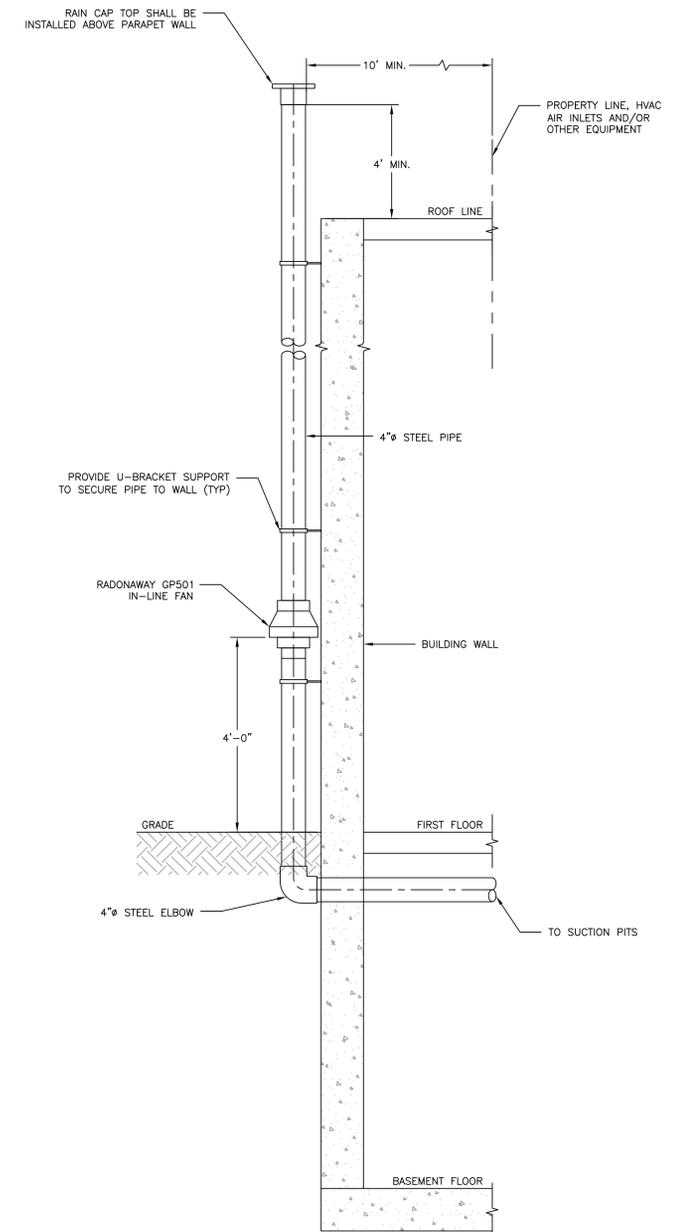
**1 TYPICAL SOIL VAPOR MONITORING POINT DETAIL**

SCALE: N.T.S.



**2 ELEVATED SUB-SLAB DEPRESSURIZATION SYSTEM PIT DETAIL**

SCALE: N.T.S.



**3 RISER DETAIL**

SCALE: N.T.S.

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

PROJECT NAME:  
**156 NAGLE AVENUE  
 NEW YORK, NY 10040**  
 PROJECT FOR:  
**DYCKMAN CRESTVIEW REALTY, LLC  
 279 WEST 231ST STREET, BRONX, NY 10463**

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

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**1**  
 1 OF 1