580 GERARD FORMER POST OFFICE VEHICLE REPAIR SITE

BRONX COUNTY

BRONX, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C203142

Prepared for:

SB Gerard Avenue LLC

40 West 39th St, 5th Floor

New York, NY 10018

Prepared by:

Roux Environmental Engineering and Geology, D.P.C.

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2024

CERTIFICATION STATEMENT

I, Robert Kovacs, P.G., certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and Green Site Remediation (DER-31).


QEP

December 16, 2024 DATE

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BRONX, NEW YORK

SITE MANAGEMENT PLAN

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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Soil Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization

SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring and reporting activities required by this Site Management Plan:

Site Identification: C203142, 580 Gerard Former Post Office Vehicle Repair Site, 586 Gerard Avenue, Bronx, New York.

Institutional Controls:	1. The Controlled Property may be used for: Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-l.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)
	2. All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);
	3. All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;
	4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
	5. Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
	6. Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
	7. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;
	8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;
	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

	10. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.
Inspections:	Frequency
Site-Wide Inspection	Within 16 months after COC is issued, then annually thereafter.
Monitoring:	
Groundwater Monitoring Wells RXMW-07 and RXMW-08	Quarterly for 8 rounds following final groundwater treatment event
Maintenance: Not Applicable	Not Applicable
Reporting:	
Periodic Review Report	First reporting period ends 16 months after COC is issued, then annually until remedial action objectives of groundwater are achieved, then every 5 years thereafter.
Groundwater Monitoring Report	Quarterly until NYSDEC approved cessation of monitoring.

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 580 Gerard Former Post Office Vehicle Repair Site located in the borough of Bronx, Bronx County, New York (hereinafter referred to as the "Site") (See **Figure 1).** The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C203142, which is administered by New York State Department of Environmental Conservation (NYSDEC).

SB Gerard Avenue LLC entered into a Brownfield Cleanup Agreement (BCA) on January 8, 2021, with the NYSDEC to remediate a 0.716 acre Site located at 580 Gerard Avenue, Bronx New York (Tax ID. No. 2353-1). An initial BCA Amendment Application was executed on January 28, 2022 to reduce the boundary of the BCP Site by 0.0364 acres in order to avoid any impact to adjacent private backyards on the eastern side of the BCP Site. The initial acreage in the BCA was also adjusted up to 0.7362. With the 0.0364 acres reduction the remaining BCP Site acreage became 0.6998 acres. A second BCA Amendment was executed on December 15, 2022, to reduce the boundary of the BCP Site again by an additional 0.0081 acres because one area on the Site near a one-story garage had to be being sloped to avoid any impact to this structure and the BCP Site acreage became 0.6917 for the final Site acreage. In addition, the address of the Site was changed by the NYC Department of Buildings to 586 Gerard Avenue.

A figure showing the Site location and boundaries of this Site and of the conditional Track 1 area and Track 2 area applicable to the Environmental Easement is provided in **Figure 2**. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement provided in **Appendix A**, which was recorded in the Bronx County Office of the City Register on July 12, 2024 at City Register File No. 2024000178650.

After completion of the remedial work, some contamination remains at this Site, which is hereafter referred to as "remaining contamination". Institutional controls (ICs) have been incorporated into the Site remedy to control exposure to remaining

contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Bronx County Clerk, requires compliance with this SMP and all ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC project manager.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC), release or closure letter; and

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the BCA (Index #C203142-12-2020; Site #C203142) for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in **Appendix B** of this SMP.

This SMP was prepared by Roux Environmental Engineering and Geology, D.P.C. (Roux)), on behalf of SB Gerard Avenue LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and errata sheet dated April 2019, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs that are required by the Environmental Easement for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. In accordance with the Environmental Easement for the Site, the NYSDEC

project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- Written 60-day advance notice of any proposed changes in Site use that are required under the terms of the BCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- Written 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan (EWP). If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the BCA and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 below includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in **Appendix B**.

Table 1: Notifications*

Name	Contact Information
NYSDEC Project Manager Steven Wu	(718) 482-6725 steven.wu@dec.ny.gov

Name	Contact Information
NYSDEC Project Manager's Supervisor Andre Obligado	(718) 482-6412 andre.obligado@dec.ny.gov
NYSDEC Site Control Kelly Lewandowski	(518) 402-9569 kelly.lewandowski@dec.ny.gov
New York State Department of Health (NYSDOH) Project Manager Mark Sergott	(518) 402-7860 mark.sergott@health.ny.gov

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

2.0 SUMMARY OF PREVIOUS REMEDIAL INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in the borough of the Bronx, Bronx County, New York and is identified as Block 23532353 and Lot 11 on the Bronx Tax Map (see **Figure 1**). The Site encompasses an approximately 0.6917-acre area and is bounded by a one-story warehouse and garage building to the north, East 150th Street and a one-story warehouse and garage building to the south, residential apartment buildings to the east, and Gerard Avenue and a construction Site to the west (see **Figure 2** – Site Layout Map). The boundaries of the Site are more fully described in **Appendix A** – Environmental Easement. The owner of the Site parcel at the time of issuance of this SMP is:

SB Gerard Avenue LLC
40 West 39th St, 5th Floor
New York, NY 10018
c/o Sharone Karten, The Karten Organization
Phone: (917) 596-0821
Email: sharonekarten@gmail.com

c/o Hugo Diaz, Stellar Management
Phone: (929) 626-0891
Email: hdiaz@stellarmanagement.com

2.2 Physical Setting

2.2.1 Land Use

Prior to demolition and the remedial action, the Site consisted of a one-story story former Post Office garage building with offices, which had a footprint of approximately 31,200 square feet. The Site was zoned for residential and commercial use (C2-4 overlay in R7A district) prior to the start of the remedial action and is currently undergoing redevelopment to construct a nine--story mixed-use residential and commercial building with subgrade parking.

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

residential properties; and the properties to the west of the Site include commercial properties.

2.2.2 Geology

Based on the previous environmental reports and investigations completed to date by Roux and other consultants, the Site was underlain by contaminated historic fill (consisting of sand, gravel, brick, concrete, and glass) before remediation to depths ranging from 7 to 14 feet below land surface (bls). The historical fill material overlaid native fine to coarse sand with some silt, gravel, and cobble. Bedrock was encountered in the southeast portion of the Site during the remedial action. Soil boring logs are provided in **Appendix C**.

2.2.3 Hydrogeology

According to water-level data collected during the Remedial Investigation (RI), the elevation of the water table surface at the Site ranges from approximately 2.94 feet relative to the North American Vertical Datum 1988 (NAVD 88) in the northern portion of the Site to 4.98 feet NAVD 88 in the southern portion of the Site. Groundwater depth at the Site varied from 21 and 24 feet bls. Groundwater flow is generally to the north-northwest toward the Harlem River. Groundwater monitoring well construction logs are provided in **Appendix C**.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 7.0 - References.

The following environmental reports are available for review:

- Phase I Environmental Site Assessment (ESA), prepared by EEA Inc./Sam Schwartz Engineering of New York, dated January 2011;
- Phase I ESA, prepared by GEI Consultants, Inc., P.C. (GEI), dated September 2018;

- Subsurface (Phase II ESA) Investigation, prepared by GEI, dated September 2018;
- Soil Testing/Waste Characterization Report, prepared by DPV Consultants, dated February 4, 2020;
- Remedial Investigation Work Plan prepared by Roux dated May 2020;
- Interim Remedial Measure Work Plan prepared by Roux dated January 19, 2022;
- Remedial Investigation Report / Remedial Action Work Plan prepared by Roux dated October 2021, as amended and approved by NYSDEC in May 2022;
- Groundwater Remediation and Soil Vapor Sampling Work Plan, prepared by Roux, dated February 6, 2023; and
- Supplemental Groundwater Treatment Work Plan, prepared by Roux, dated February 5, 2024.

Based on review of the first 2011 EEA Phase I Report and GEI September 2018 Phase I ESA, the Site was first developed by 1950 as a vehicle maintenance and storage facility for the United States Postal Office. By 2001 through 2007, the building was utilized for automotive service, vehicle repair, and parking. After 2007, the Site was occupied by a construction company for office use and storage. The surrounding area was historically developed with residential, industrial, and commercial properties. Based on the specific nature of the identified operations, these consultants concluded these types of businesses involved the storage and use of hazardous substances and/or petroleum products, and/or generated hazardous and petroleum wastes. Interior floor drains were observed in the floor throughout the building, and the consultants concluded that given the age of the building constructed in the 1950s, it is likely that these drains discharge to the municipal sewer system, but no investigation to confirm this fact was noted in the Report.

This initial Phase I report also noted that the Site was listed in the New York State Department of Environmental Conservation Petroleum Bulk Storage (PBS) database under Facility Identification Numbers 2-333212 and 2-476021 and the Spills database under Spill Incident Numbers 9213223 and 9007668. In addition, the Post Office was a listed RCRA facility at this Site under RCRA Facility ID NY5180010451) large quantity generator. The Phase I ESA states that no hazardous waste activity was listed by New York State for this RCRA Facility, but this conclusion was not confirmed by the documentation provided. The

Post Office was listed as a small quantity generator under RCRA Facility ID NYD982727885 at this Site from 1992 until 2009, even though the Post Office vacated in about 2000-2001. Therefore, this ID # was likely related to spill closures when varying amounts and types of wastes were generated and disposed of from the Site under this Facility ID Number. Finally, a tenant named Autorama Enterprises of Bronx, using the 610 Gerard Avenue address, was also listed as a RCRA Facility at the Site under ID NYR000100255, but according to EEA, no hazardous waste activity was listed by New York State for this RCRA Facility. However, the type of waste generated was not specified.

The reports noted that some remnants of the tank systems still remained on the Site and both reports noted that same recognized environmental conditions (RECs), notably underground gasoline tanks, underground fuel oil tanks, hydraulic lifts, and floor drains. Both Phase I Reports also discussed two closed spill incidents.

A Phase II subsurface investigation was performed by GEI in August 2018, which was summarized in a September 2018 Phase II Report. A total of eight (8) test borings were performed in the building on the Site. Soil borings were advanced and analytical samples were collected to determine if there are impacts to soils underlying the Site. Two (2) soil borings were advanced into the groundwater table and two (2) groundwater grab samples were collected. However, it is important to note that these borings were not located in the vicinity of the former tank farm portion of the Site or where the tank was still located at the time of this report. Additionally, four (4) soil vapor samples were collected from temporary implants installed beneath the building floor slab. The soil, groundwater, and soil vapor exceedances that directly result from historic operations and contaminated historic fill were detected.

A soil waste characterization investigation was performed by DPV in February 2020. DPV took 25 soil sample sets (TAL/TCL + 30 and VOC grab samples) from 13 test pit locations throughout the Site.

GEI updated its Phase I Report in May 2020 without any new significant findings.

A May 2020 Remedial Investigation Work Plan with this application to further investigation the contamination found to date. The scope will include 14 soil borings

throughout the Site, the conversion of 6 soil borings into six permanent groundwater monitoring wells (MW 1 through MW-6), and ten soil vapor samples.

The following sections summarize soil, groundwater, and soil vapor quality data based on the RI completed by Roux:

- Soil: The Site was covered with 7 to 14 feet bls of urban fill. Soil samples indicated the upper fill from 0 to 2, 4 to 6, and 10 to 12 feet bls contained volatile organic compounds (VOCs), semi-volatile organic compounds [SVOCs (primarily PAHs)], polychlorinated biphenyls (PCBs), and elevated metals (primarily lead and mercury) in exceedance of the Soil Cleanup Objectives [Unrestricted Soil Cleanup Objectives (UUSCOs), Restricted Residential Soil Cleanup Objectives (RRSCOs), and/or Protection of Groundwater Soil Cleanup Objectives (PGWSCOs)]. These exceedances found in soil are attributed to typical urban fill across the Site. Two soil samples collected at deeper intervals (23 to 25 feet bls) had exceedances of petroleum VOCs and chromium. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) concentrations were either non-detect or detected below the NYSDEC guidance values.
- Groundwater: Depth to groundwater at the Site varied from 21 to 24 feet bls. The direction of groundwater flow is to the north-northwest towards the Harlem River. Groundwater samples detected metals including iron, magnesium, manganese and sodium exceeding the Ambient Water-Quality Standards and Guidance Values (AWQSGVs), however these are naturally occurring metals commonly found in groundwater, and field filtered and unfiltered samples yielded fairly consistent results. Limited VOCs were detected in some locations in the northern portion of the Site at low to moderate concentrations. PFOA and PFOS were detected at marginal concentrations in all samples.
- Soil Vapor: Soil vapor samples detected a wide range of hydrocarbon compounds in nearly every sample. Most of these soil vapor detections were low and were not found in groundwater or soil, with the exception of some hydrocarbon VOCs, which were found at elevated concentrations in one deep soil sample (23 to 25 feet bls) and two groundwater samples collected from the northern portion of the Site. Chlorinated VOCs trichloroethylene (TCE) and tetrachloroethylene (PCE) were detected in most samples at low to moderate concentrations across the Site. These compounds were not detected in on-Site soil or groundwater. Three soil vapor samples were collected during the remedial action and TCE and PCE concentrations were either non-detect or detected at *de minimis* concentrations.

1. Site preparation to abate asbestos-containing materials (ACM) associated with the former building structure prior to demolition to facilitate remediation.

2. Demolition of the former building structure to enable implementation of the selected remedy.

3. Excavation of soil/fill exceeding Unrestricted Use Soil Cleanup Objectives (SCOs) to achieve a Track 1 remedy and excavation of soil/fill exceeding Restricted Residential Use SCOs to achieve a Track 2 remedy to the proposed remedial excavation depths across the Site. Soil/fill in two hotspot areas were also excavated.
4. Construction dewatering and handling of extracted groundwater by containerizing for on-Site pre-treatment prior to discharge to the city sewer system under the appropriate permits.
5. *In-situ* chemical treatment of volatile organic compounds (VOCs) in groundwater via excavation application and injections to achieve a bulk reduction in groundwater contaminant concentrations and to further remediate deep soil contamination in the VOC hotspot area.
6. Collection and analysis of post-excavation confirmation samples to evaluate the performance of the remedy for soil within the general excavation area and the chromium hot spot excavation area.
7. Installation of groundwater monitoring wells and the collection and analysis of post-treatment confirmation samples to evaluate the performance of the remedy for groundwater and for soil within the VOC hot spot excavation area.
8. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal.
9. Importation of clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for use as backfill to establish redevelopment design grades, as necessary.
10. Installation of a vapor barrier system (minimum thickness 20 mil) under the building foundation's slab and up the foundation walls as a green remediation construction element.

The Site was remediated in accordance with the Remedial Investigation RIR/RAWP dated May 2022. The following components were completed as part of the remedial action:

1. Site preparation to abate asbestos-containing materials (ACM) associated with the former building structure prior to demolition to facilitate remediation.
2. Demolition of the former building structure to enable implementation of the selected remedy.
3. Demolition, decommissioning, and removal of former infrastructure associated with previous Site usage that could have contributed to contamination (i.e., abandoned 2,500-gallon underground storage tank, truck/hydraulic lifts, etc.).
4. Excavation of approximately 17,326 tons of soil/fill exceeding Unrestricted Use Soil Cleanup Objectives (SCOs) to achieve a Track 1 remedy and of approximately 15,054 tons of soil/fill exceeding Restricted Residential Use SCOs to achieve a Track 2 remedy to proposed remedial excavation depths of

15 to 18 feet below land surface (bls) across the Site. Two hotspot areas were excavated to a depth of approximately 27 feet bls.

5. Screening for indications of contamination (by visual means, odor, and monitoring with a photoionization detector) of excavated soil during intrusive Site work.
6. Construction dewatering (as required) and handling of extracted groundwater by containerizing for on-Site pre-treatment prior to discharge to the city sewer system under the appropriate permits.
7. In-situ chemical treatment of volatile organic compounds (VOCs) in groundwater to achieve a bulk reduction in groundwater contaminant concentrations and to further remediate deep soil contamination in the VOC hotspot area.
8. Collection and analysis of post-excavation confirmation samples every 1,500 square feet to evaluate the performance of the remedy for soil within the general excavation area and the chromium hot spot excavation area.
9. Collection and analysis of post-treatment confirmation samples to evaluate the performance of the remedy for groundwater and for soil within the VOC hot spot excavation area.
10. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal.
11. Importation of clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) for use as backfill to establish redevelopment design grades, as necessary.
12. Installation of a vapor barrier system (minimum thickness 20 mil) as a green remediation construction element.
13. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State, and local rules and regulations.
14. Installation of groundwater monitoring wells.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated June 15, 2022, are as follows:

2.4.1 Groundwater

RAOs for Public Health Protection

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

- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

2.4.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.4.3 Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil

The remaining soil contamination after the remedial action was completed in the conditional Track 1 portion of the Site is limited to the Track 2 portion of the Site where Track 1 UUSCOs were not met but where Track 2 Restricted Residential Soil Cleanup Objectives (RRSCOs) were achieved (3,050 square-foot area of land in the southern portion of the Site as shown on the Easement Survey map in **Figure 2**). Based on the endpoint soil samples collected during the remedial action, the remaining soil contamination above the Track 1 UUSCOs but below the Track 2 RRSCOs in the Track 2 area is limited to SVOC and metal exceedances. All remaining contamination is located under the building foundation slab in the Track 2 area. For the Track 2 area where the UUSCOs were not achieved, long term management of the ICs and residual contamination will be performed in accordance with this SMP. The conditional Track 1 area is also temporarily subject to this SMP because of the ongoing groundwater monitoring that will

occur pursuant to these terms in this SMP. The areas of the Site that achieved Track 1 UUSCOs and Track 2 RRSCOs are shown in **Figure 2**.

Endpoint soil samples were collected post-excavation during the remedial action. **Tables 2 and 3** and **Figure 3** summarize the results of soil samples collected that exceeded the UUSCOs in the Track 2 area of the Site after completion of remedial action.

2.5.2 Groundwater

The remaining groundwater contamination after the remedial action was completed is limited to petroleum VOCs in a localized area in the northwestern portion of the Conditional Track 1 area. The groundwater contamination is a result of a hotspot area detected in soil and groundwater (RXSB-06/RXMW-04) from the RI. During the remedial action, soil was excavated to the water table and removed from the Site. Following removal, *in situ* chemical treatment was applied within the hotspot excavation limits utilizing Advanced Oxygen Release Compound (ORC Advanced®), a REGENESIS® bioremediation product. ORC Advanced® was applied directly to exposed soil and groundwater in the hotspot excavation and then backfilled to facilitate long-term aerobic bioremediation of residual contaminants.

Table 4 and **Figure 4** summarize the groundwater sample results that exceeded the AWQSGVs after completion of the remedial action. Groundwater samples RXMW-07 and RXMW-08 were collected from two off-Site groundwater monitoring wells installed downgradient of the treated hotspot area. Groundwater sample RXMW-09 was collected from a temporary groundwater monitoring well installed within the treated hotspot area, which has since been destroyed by the construction project. Groundwater monitoring will be performed pursuant to the terms in the SMP to confirm that the in-situ treatment has effectively degraded the remaining groundwater contamination.

2.5.3 Soil Vapor

The remedial elements that have been implemented, including soil excavation and offsite disposal, soil hot spot excavation and offsite disposal and groundwater treatment have all achieved the objectives of removing contamination from the Site (as evident from the post-excavation sample results), reducing the potential for soil vapor intrusion. This

was expected to improve on-Site soil vapor quality by reducing or eliminating potential source material. As part of the remedial action, three soil vapor samples were collected from the bottom of excavation. A soil vapor intrusion (SVI) evaluation was completed and soil vapor conditions at the bottom of excavation below the new construction were not a concern. The results of the SVI evaluation are documented in this SMP and the FER. In addition, as part of construction, waterproofing and vapor barriers were installed below the foundation and along subsurface walls as a green remediation construction element.

3.0 INSTITUTIONAL CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, Institutional Controls (ICs) are required to protect human health and the environment. This IC Plan describes the procedures for the implementation and management of all ICs at the Site. The IC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all ICs on the Site;
- The basic implementation and intended role of each IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of ICs, such as the implementation of the Excavation Work Plan (EWP) (as provided in **Appendix D**) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the ICs required by the Site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) prevent future exposure to remaining contamination; and (2) limit the use and development of the Site to restricted residential, commercial, and industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 2**. These ICs are:

1. The Controlled Property may be used for: Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-

l.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv). For the Conditional Track 1 portion of the Site, to the extent unconditional Track 1 is achieved is less than five years after the Certificate of Completion is issued, an amendment to the Environmental Easement may be filed to remove this portion of the Site from the Easement as Controlled Property;

2. All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);
3. All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;
4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
5. Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
6. Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
7. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;
8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;
9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP; and
10. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

3.3 Site-Wide Inspection

Site-wide inspections will be performed within 16 months after COC is issued, then annually thereafter. These periodic inspections must be conducted when the ground surface is visible (i.e., no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections

will also be performed after all severe weather conditions that may affect the remaining contamination at the Site. A comprehensive Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report.

During an inspection, an inspection form will be completed as provided in **Appendix G** – Site Management Forms. The inspections will determine and document the following:

- Compliance with all ICs, including Site usage;
- General Site conditions at the time of the inspection;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement; and
- Confirm Site records are complete and up to date.

Reporting requirements are outlined in Section 6.0 of this SMP.

Inspections will also be performed in the event of an emergency. An inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the ICs implemented at the Site by a qualified environmental professional, as determined by the NYSDEC project manager. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.0 GROUNDWATER MONITORING PLAN

4.1 General

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

This SMP describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this SMP provides information on:

- Sampling locations, protocol and frequency;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Inspection and periodic certification, as required in this SMP.

Reporting requirements are provided in Section 6.0 of this SMP.

4.2 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater monitoring wells on a quarterly basis. Sample locations, required analytical parameters, and schedule are provided in **Table 5** – Post Remediation Sampling Requirements and Schedule below. Modifications

to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 5: Post-Remediation Sampling Requirements and Schedule

Sample Location	Analytical Parameter	Schedule
Monitoring Wells (RXMW-07 and RXMW-08)	VOCs (EPA Method 8260D)	Quarterly for 8 rounds following final groundwater treatment event

Detailed sample collection and analytical procedures and protocols are provided in **Appendix F** – Field Sampling Plan/Quality Assurance Project Plan. There are no other media to be monitored or sampled following completion of the remedial action.

4.2.1 Groundwater Sampling

Groundwater monitoring will be performed as part of this SMP. Post-remediation sampling will occur quarterly for a total of 8 rounds to assess the performance of the remedy. Following the fourth sampling round, a Groundwater Monitoring Plan Summary Report will be prepared and submitted to the NYSDEC outlining the sampling results and proposed course of action. Modifications to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Two off-Site monitoring wells have been installed to monitor groundwater conditions downgradient of the treated hotspot area (Conditional Track 1 area). These off--Site wells have been designed to monitor the overall performance of the remedial action. The groundwater monitoring wells were installed in accordance with the approved Groundwater Remediation and Soil Vapor Sampling Work Plan dated February 6, 2023.

As part of the groundwater monitoring, the remedial party will measure depth to the water of each monitoring well before and during sampling.

The monitoring wells are constructed of 2-inch PVC with 10 feet of 0.020-inch slot screens, set approximately five feet below the water table and five feet above the water table at each location. The annular space surrounding the well screens were backfilled with sand and a two-foot grout seal with a flush-mounted steel well cover at grade. Wells RXMW-07 and RXMW-08 are located within the sidewalk northwest of the Site.

Monitoring well construction logs are included in **Appendix C** of this SMP. The groundwater monitoring well locations are shown on **Figure 4** of this SMP.

If biofouling or silt accumulation occurs in the off-Site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable. Repairs and/or replacement of wells will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repairs or decommissioning of any monitoring wells for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be completed only with prior approval from the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC guidance "CP-43: Groundwater Monitoring Well Decommissioning Procedures." If an event renders the wells unusable, the monitoring wells will be decommissioned and replaced in the nearest available locations, unless otherwise approved by the NYSDEC project manager.

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

Deliverables for the groundwater monitoring plan are specified in Section 6.0 – Reporting Requirements.

4.2.2 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling logs as provided in **Appendix G** - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling logs. The sampling logs will serve as the inspection form for the monitoring wells. Additional details regarding monitoring and sampling protocols are provided in the Field Sampling Plan/Quality Assurance Project Plan provided as **Appendix F** of this SMP.

5.0 PERIODIC ASSESSMENTS/EVALUATIONS

5.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the protectiveness of a given Site. Vulnerability assessments provide information so that the Site is prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

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

- Flood Plain: The Site is not located in a flood plain, low-lying or low-groundwater recharge area.
- Site Drainage and Storm Water Management: During construction, adequate storm management systems were constructed for the building and Site; therefore, flooding is not anticipated.
- Erosion: The Site will be entirely covered by the building footprint and walkways, therefore, erosion at the Site is not anticipated during periods of severe rain events.
- High Wind: No areas of the Site have been identified which may be susceptible to damage from the wind itself or falling objects, such as trees or utility structures during periods of high wind.
- Electricity: The Site is potentially susceptible to power loss and/or dips/surges in voltage during severe weather events, including lightning strikes, and the associated impact on Site equipment and operations. However, the surrounding area is highly developed and power outages will be rectified as soon as possible by the electricity provider. Due to the variability in annual weather patterns, it is assumed that emergency weather situations will be infrequent, and damages rectified by the appropriate relief agency.
- Spill/Contaminant Release: No areas of the Site have been identified that may be susceptible to a spill or other contaminant release due to storm-related damage caused by flooding, erosion, high winds, loss of power etc.

- Wildfires: The immediate area surrounding the Site is not wooded and therefore there is no wildfire risk.

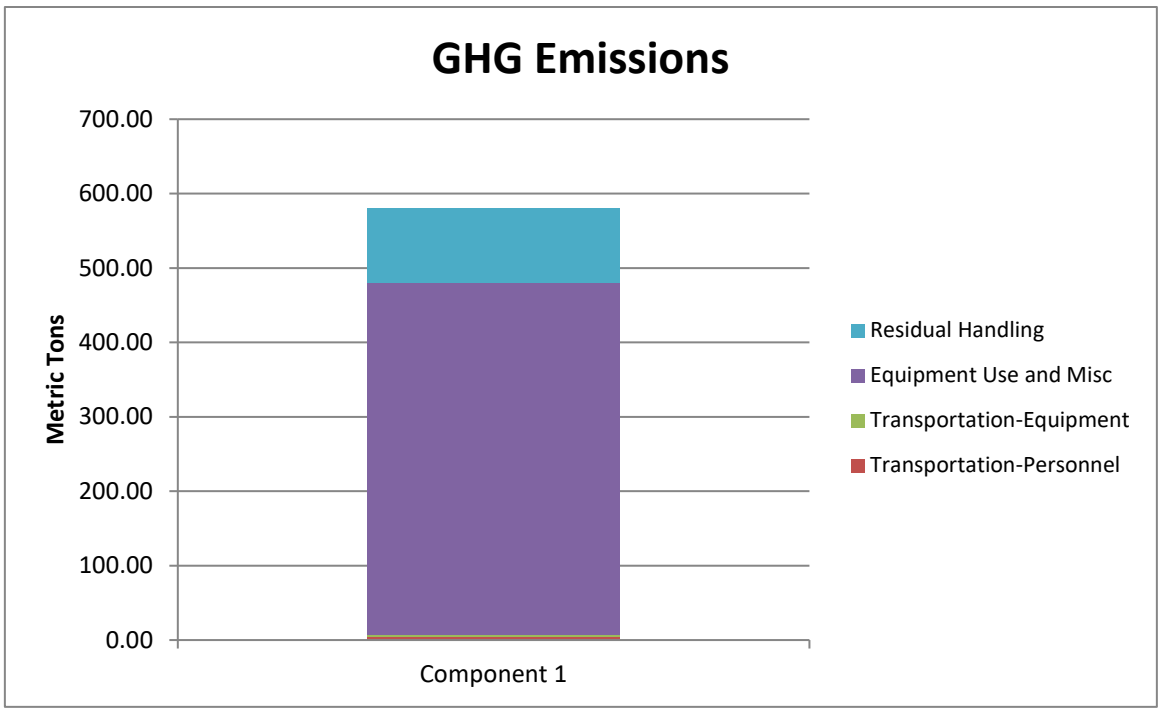
5.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this FER.

5.2.1 SiteWise Analysis for the Implemented Remedial Action

At the time when the RIR/RAWP was prepared, no environmental footprint analysis was required or completed prior to the implementation of the remedial action. As part of this FER, SiteWise was used to calculate the carbon footprint of the Remedial Action that was implemented. This includes one major component of the remedy, the excavation of on-Site soil from the Track 1 and Track 2 areas. Based on this major component of the remedy, the following data tables were generated using SiteWise.

Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage
		metric ton	MMBTU	gallons	MWH
Component 1	Consumables	54.55	1.6E+03	NA	NA
	Transportation-Personnel	4.50	5.7E+01	NA	NA
	Transportation-Equipment	2.73	3.6E+01	NA	NA
	Equipment Use and Misc	473.69	8.5E+03	0.0E+00	0.0E+00
	Residual Handling	99.68	1.5E+03	NA	NA
	Sub-Total	635.16	1.17E+04	0.00E+00	0.00E+00



Greenhouse gasses generated during excavation were predominantly from heavy equipment usage on-Site to excavate soil (equipment use and miscellaneous), transport of soil to disposal or recycling facilities (residual handling), and disposal or treatment of soil at facilities (residual handling).

Appendix I contains the summary of the SiteWise Analysis completed for the implemented remedial action.

5.3 Soil Vapor Intrusion Evaluation

A soil vapor intrusion evaluation was required to be performed before occupancy of the building currently under construction at the time this SMP.

Soil vapor sampling was completed on January 17, 2023 from the bottom of excavation in accordance with the Groundwater Remediation and Soil Vapor Sampling Work Plan (Work Plan) dated February 6, 2023. A total of three soil vapor samples (RXSV-8 through RXSV-10) were analyzed for target compound list (TCL) VOCs. The soil vapor sample locations and detections are shown in **Figure 5**.

Based upon the date of sampling, the analytical results were compared to Matrices A, B, and C of the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the

State of New York, October 2006 (matrices were updated in May 2017). The matrices provide guidance relative to eight common VOC contaminants including, carbon tetrachloride, cis-1,2-dichloroethene, 1,1-dichloroethene, trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane, methylene chloride, and vinyl chloride. Sample detections of these VOC contaminants were either non-detect or at *de minimis* concentrations and did not warrant monitoring or mitigation.

The mass excavation up to 17 feet bls across the Site, coupled with the disposal of approximately 34,026 tons of soil, resulted in the removal of potential source material from the Site. Based on the end-point confirmatory samples, VOC concentrations in soil were not detected or were below the UUSCOs. Groundwater contamination that could potentially cause soil vapor intrusion has been treated and post-treatment groundwater monitoring will continue as described in this SMP.

Although not an element of the remedy, an active mechanical ventilation system in the basement parking garage will be installed as a component of the building and will operate in accordance with the requirements of the New York City Building Code. The ventilated parking garage provides a level of protection by bringing oxygen into the basement levels and will help prevent the potential accumulation of vapors migrating from underlying soil. The parking garage fans will be installed, operated, and maintained in accordance with New York City Building Code. In addition, as part of construction, waterproofing and vapor barriers were installed below the foundation and along subsurface walls as a green remediation construction element.

The breadth of this evaluation was determined based upon discussions with the NYSDEC and NYSDOH project managers and no further soil vapor sampling or soil vapor mitigation has been deemed to be required for this Site (confirmed by NYSDEC and NYSDOH project managers on a project call on June 8, 2023). Based upon these discussions and agency requirements, soil vapor conditions at the bottom of excavation below the new construction were not a concern and no soil vapor intrusion (SVI) sampling work plan was required.

5.4 Remedial System Optimization

A Remedial System Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed because unconditional Track 1 has not been achieved on the conditional Track 1 portion of the site within five years or there is newly discovered contamination on the Track 2 portion of the site. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy. If groundwater treatment is not effective, remedial optimization will be implemented.

6.0 REPORTING REQUIREMENTS

6.1 Site Management Reports

All Site management inspection events will be recorded on the appropriate Site management forms provided in **Appendix G**. These forms are subject to NYSDEC project manager revision.

All applicable inspection forms and other records, including media sampling data generated for the Site during the reporting period will be provided in electronic format to the NYSDEC project manager in accordance with the requirements of **Table 6** below and summarized in the Periodic Review Report.

Table 6: Schedule of Inspection Reports

Task/Report	Reporting Frequency*
Periodic Review Report	First report 16 months after COC is issued, then annually until remedial action objectives of groundwater are achieved, then every 5 years thereafter.
Groundwater Monitoring Report	Quarterly until NYSDEC approved cessation of monitoring.

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

All inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

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

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

Completion of the Site Management Forms is one of the owner's responsibilities, listed in **Appendix H**.

6.2 Periodic Review Report

The Periodic Review Report (PRR) will consist only of the certification as specified in Section 6.2.1 except in the event where there have been changes to the Site or data gathered during the certifying period. Given such an event, the submittal of a comprehensive PRR will be necessary, as specified below.

A PRR will be submitted to the Department beginning 30 days after the initial 16-month certifying period. This initial certifying period commences upon issuance of the Certificate of Completion. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually until remedial action objectives of groundwater are achieved, then every 5 years thereafter to the Department or at another frequency as may be subsequently required by the Department.

In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in **Appendix A** - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ICs required by the remedy for the Site.
- Results of the required annual Site inspections and severe condition inspections, if applicable.

- All applicable Site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A summary of any data and/or information generated during the reporting period, with comments and conclusions, if any.
- A Site evaluation includes the following:
  - The compliance of the remedy with the requirements of the Site -specific RAWP, ROD or Decision Document;
  - Any new conclusions or observations regarding Site contamination based on inspections or data generated;
  - Recommendations regarding any necessary changes to the remedy; and
  - The overall performance and effectiveness of the remedy.

6.2.1 Certification of Institutional Controls

Within 30 days after the end of each certifying period, as determined by the NYSDEC, the following certification will be provided to the Department:

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

- *The institutional control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;*
- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the Site is compliant with the environmental easement;*
- *No new information has come to my attention, including groundwater monitoring data from wells located at the Site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-Site contamination are no longer valid; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Robert Kovacs, of Roux Environmental Engineering and Geology, D.P.C., 209 Shafter St. Islandia, NY 11749, am certifying as Owner's Designated Site Representative and I have been authorized and designated by all Site owners to sign this certification for the Site."

For BCP projects, every five years the following certification will be added:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the Periodic Review Report, if such report is required for the period. Otherwise, the Certification will be submitted as a stand-alone document.

The Periodic Review Report/Certification will be submitted, in electronic format, to the NYSDEC Central Office, the NYSDEC Regional Office in which the Site is located and the NYSDOH Bureau of Environmental Exposure Investigation. The Periodic Review Report/Certification may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

6.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional control, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager. Upon completion of the Corrective Measure, a signed certification form must be submitted to the Department.

6.4 Remedial System Optimization Report

If an RSO is to be performed (see Section 5.4), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present

recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

7.0 REFERENCES

DPV Consultants, Soil Testing/Waste Characterization Report, on behalf of Silverback Development, dated February 4, 2020.

EEA Inc. Sam Schwartz Engineering of New York, New York on behalf of EMMES Asset Management Company Ltd., LLC., Phase I ESA, dated January 2011.

GEI on behalf of Hunton Andrews Kurth LLP, Phase I ESA, dated September 2018.

GEI on behalf of Hunton Andrews Kurth LLP, Subsurface (Phase II) Investigation, dated September 2018.

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

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

NYSDEC, DER-10 – "Technical Guidance for Site Investigation and Remediation."

NYSDEC, Groundwater Remediation and Soil Vapor Sampling Work Plan Approval Letter, dated February 10, 2023.

NYSDEC, Supplemental Groundwater Treatment Work Plan Approval Letter, dated February 6, 2024.

NYS Division of Environmental Remediation, NYS Department of Environmental Conservation Decision Document (DD), dated June 15, 2022.

Roux, Groundwater Remediation and Soil Vapor Sampling Work Plan, dated February 6, 2023.

Roux, Remedial Investigation Work Plan (RIWP), dated March 9, 2021.

Roux, Remedial Investigation Report (RIR)/Remedial Action Work Plan (RAWP), dated May 2022.

Roux, Supplemental Groundwater Treatment Work Plan, dated February 5, 2024.

TABLES

1. Notifications (embedded in text)
2. Summary of Remaining SVOC Exceedances in Soil Samples
3. Summary of Remaining Metal Exceedances in Soil Samples
4. Summary of VOC Exceedances in Groundwater Samples
5. Post-Remediation Groundwater Sampling Requirements and Schedule (embedded in text)
6. Schedule of Monitoring/Inspection Reports (embedded in text)
7. List of Soil Cleanup Objectives

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-A1-01	BCS-A2-01	BCS-B1-01	BCS-B2-01	BCS-C1-01	BCS-C2-01	BCS-D1-01
		Sample Date:	12/13/2022	12/13/2022	12/13/2022	12/13/2022	12/20/2022	12/29/2022	01/04/2023
		Sample Depth (ft bls):	17 - 17.7	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5
		Normal Sample or Field Duplicate:	N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
1,2,4,5-Tetrachlorobenzene	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
1,4-Dioxane (P-Dioxane)	0.1	MG/KG	0.039 U	0.039 U	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U
2,3,4,6-Tetrachlorophenol	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2,4,5-Trichlorophenol	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2,4,6-Trichlorophenol	--	MG/KG	0.16 U	0.16 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U
2,4-Dichlorophenol	--	MG/KG	0.16 U	0.16 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U
2,4-Dimethylphenol	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2,4-Dinitrophenol	--	MG/KG	0.31 U	0.31 U	0.31 U	0.29 U	0.31 U	0.28 U	0.29 U
2,4-Dinitrotoluene	--	MG/KG	0.079 U	0.078 U	0.078 U	0.074 U	0.078 U	0.07 U	0.073 U
2,6-Dinitrotoluene	--	MG/KG	0.079 U	0.078 U	0.078 U	0.074 U	0.078 U	0.07 U	0.073 U
2-Chloronaphthalene	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2-Chlorophenol	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2-Methylnaphthalene	--	MG/KG	0.019 J	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2-Methylphenol (O-Cresol)	0.33	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2-Nitroaniline	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
2-Nitrophenol	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
3,3'-Dichlorobenzidine	--	MG/KG	0.16 U	0.16 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U
3-Nitroaniline	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4,6-Dinitro-2-Methylphenol	--	MG/KG	0.31 U	0.31 U	0.31 U	0.29 U	0.31 U	0.28 U	0.29 U
4-Bromophenyl Phenyl Ether	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4-Chloro-3-Methylphenol	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4-Chloroaniline	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4-Chlorophenyl Phenyl Ether	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4-Methylphenol (P-Cresol)	0.33	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4-Nitroaniline	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
4-Nitrophenol	--	MG/KG	0.79 U	0.78 U	0.78 U	0.74 U	0.78 U	0.7 U	0.73 U
Acenaphthene	20	MG/KG	0.39 U	0.047 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Acenaphthylene	100	MG/KG	0.39 U	0.018 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Acetophenone	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Anthracene	100	MG/KG	0.39 U	0.22 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Atrazine	--	MG/KG	0.16 U	0.16 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U
Benzaldehyde	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 UT	0.34 U	0.36 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-A1-01	BCS-A2-01	BCS-B1-01	BCS-B2-01	BCS-C1-01	BCS-C2-01	BCS-D1-01
		Sample Date:	12/13/2022	12/13/2022	12/13/2022	12/13/2022	12/20/2022	12/29/2022	01/04/2023
		Sample Depth (ft bls):	17 - 17.7	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5
		Normal Sample or Field Duplicate:	N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
Benzo(A)Anthracene	1	MG/KG	0.018 J	0.92	0.038 U	0.041	0.038 U	0.034 U	0.036 U
Benzo(A)Pyrene	1	MG/KG	0.039 U	0.85	0.038 U	0.033 J	0.038 U	0.034 U	0.036 U
Benzo(B)Fluoranthene	1	MG/KG	0.01 J	1	0.038 U	0.04	0.038 U	0.034 U	0.036 U
Benzo(G,H,I)Perylene	100	MG/KG	0.39 U	0.52	0.38 U	0.021 J	0.38 U	0.34 U	0.36 U
Benzo(K)Fluoranthene	0.8	MG/KG	0.039 U	0.47	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U
Benzyl Butyl Phthalate	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Biphenyl (Diphenyl)	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Bis(2-Chloroethoxy) Methane	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	MG/KG	0.039 U	0.039 U	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U
Bis(2-Chloroisopropyl) Ether	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Bis(2-Ethylhexyl) Phthalate	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Caprolactam	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Carbazole	--	MG/KG	0.39 U	0.035 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Chrysene	1	MG/KG	0.011 J	0.79	0.38 U	0.033 J	0.38 U	0.34 U	0.36 U
Cresols, M & P	0.33	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Dibenz(A,H)Anthracene	0.33	MG/KG	0.039 U	0.15	0.038 U	0.023 J	0.038 U	0.034 U	0.036 U
Dibenzofuran	7	MG/KG	0.39 U	0.019 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Diethyl Phthalate	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Dimethyl Phthalate	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Di-N-Butyl Phthalate	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Di-N-Octylphthalate	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Fluoranthene	100	MG/KG	0.017 J	1.8	0.38 U	0.058 J	0.38 U	0.34 U	0.36 U
Fluorene	30	MG/KG	0.39 U	0.049 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Hexachlorobenzene	0.33	MG/KG	0.039 U	0.039 U	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U
Hexachlorobutadiene	--	MG/KG	0.079 U	0.078 U	0.078 U	0.074 U	0.078 U	0.07 U	0.073 U
Hexachlorocyclopentadiene	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Hexachloroethane	--	MG/KG	0.039 U	0.039 U	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U
Indeno(1,2,3-C,D)Pyrene	**0.5**	MG/KG	0.039 U	**0.65**	0.038 U	0.046	0.038 U	0.034 U	0.036 U
Isophorone	--	MG/KG	0.16 U	0.16 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U
Naphthalene	12	MG/KG	0.39 U	0.016 J	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Nitrobenzene	--	MG/KG	0.039 U	0.039 U	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U
N-Nitrosodi-N-Propylamine	--	MG/KG	0.039 U	0.039 U	0.038 U	0.037 U	0.038 U	0.034 U	0.036 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-A1-01	BCS-A2-01	BCS-B1-01	BCS-B2-01	BCS-C1-01	BCS-C2-01	BCS-D1-01
		Sample Date:	12/13/2022	12/13/2022	12/13/2022	12/13/2022	12/20/2022	12/29/2022	01/04/2023
		Sample Depth (ft bls):	17 - 17.7	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5
		Normal Sample or Field Duplicate:	N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
N-Nitrosodiphenylamine	--	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Pentachlorophenol	0.8	MG/KG	0.31 U	0.31 U	0.31 U	0.29 U	0.31 U	0.28 U	0.29 U
Phenanthrene	100	MG/KG	0.039 J	0.96	0.38 U	0.034 J	0.38 U	0.34 U	0.36 U
Phenol	0.33	MG/KG	0.39 U	0.39 U	0.38 U	0.37 U	0.38 U	0.34 U	0.36 U
Pyrene	100	MG/KG	0.024 J	1.7	0.38 U	0.058 J	0.38 U	0.34 U	0.36 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-D1-01	BCS-D2-01	BCS-E1-01	BCS-E2-01	BCS-F1-01	BCS-F2-01	BCS-G1-01
		Sample Date:	01/04/2023	01/04/2023	01/11/2023	01/11/2023	02/17/2023	02/17/2023	02/17/2023
		Sample Depth (ft bls):	17 - 17.5	17 - 17.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	FD	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
1,2,4,5-Tetrachlorobenzene	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
1,4-Dioxane (P-Dioxane)	0.1	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
2,3,4,6-Tetrachlorophenol	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2,4,5-Trichlorophenol	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2,4,6-Trichlorophenol	--	MG/KG	0.14 U	0.16 U	0.14 U	0.14 U	0.14 U	0.15 U	0.14 U
2,4-Dichlorophenol	--	MG/KG	0.14 U	0.16 U	0.14 U	0.14 U	0.14 U	0.15 U	0.14 U
2,4-Dimethylphenol	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2,4-Dinitrophenol	--	MG/KG	0.29 U	0.33 U	0.29 U	0.27 U	0.28 UT	0.29 UT	0.29 UT
2,4-Dinitrotoluene	--	MG/KG	0.072 U	0.082 U	0.073 U	0.069 U	0.071 U	0.074 U	0.073 U
2,6-Dinitrotoluene	--	MG/KG	0.072 U	0.082 U	0.073 U	0.069 U	0.071 U	0.074 U	0.073 U
2-Chloronaphthalene	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2-Chlorophenol	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2-Methylnaphthalene	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2-Methylphenol (O-Cresol)	0.33	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2-Nitroaniline	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
2-Nitrophenol	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
3,3'-Dichlorobenzidine	--	MG/KG	0.14 U	0.16 U	0.14 U	0.14 U	0.14 U	0.15 U	0.14 U
3-Nitroaniline	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4,6-Dinitro-2-Methylphenol	--	MG/KG	0.29 U	0.33 U	0.29 U	0.27 U	0.28 UT	0.29 UT	0.29 UT
4-Bromophenyl Phenyl Ether	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4-Chloro-3-Methylphenol	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4-Chloroaniline	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4-Chlorophenyl Phenyl Ether	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4-Methylphenol (P-Cresol)	0.33	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4-Nitroaniline	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
4-Nitrophenol	--	MG/KG	0.72 U	0.82 U	0.73 U	0.69 U	0.71 U	0.74 U	0.73 U
Acenaphthene	20	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Acenaphthylene	100	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Acetophenone	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Anthracene	100	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Atrazine	--	MG/KG	0.14 U	0.16 U	0.14 UT	0.14 UT	0.14 U	0.15 U	0.14 U
Benzaldehyde	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-D1-01	BCS-D2-01	BCS-E1-01	BCS-E2-01	BCS-F1-01	BCS-F2-01	BCS-G1-01
		Sample Date:	01/04/2023	01/04/2023	01/11/2023	01/11/2023	02/17/2023	02/17/2023	02/17/2023
		Sample Depth (ft bls):	17 - 17.5	17 - 17.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	FD	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
Benzo(A)Anthracene	1	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.025 J
Benzo(A)Pyrene	1	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.018 J
Benzo(B)Fluoranthene	1	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.019 J
Benzo(G,H,I)Perylene	100	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.011 J
Benzo(K)Fluoranthene	0.8	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.011 J
Benzyl Butyl Phthalate	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Biphenyl (Diphenyl)	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Bis(2-Chloroethoxy) Methane	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
Bis(2-Chloroisopropyl) Ether	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Bis(2-Ethylhexyl) Phthalate	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Caprolactam	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Carbazole	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Chrysene	1	MG/KG	0.36 U	0.41 U	0.0063 J	0.34 U	0.35 U	0.36 U	0.019 J
Cresols, M & P	0.33	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Dibenz(A,H)Anthracene	0.33	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
Dibenzofuran	7	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Diethyl Phthalate	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Dimethyl Phthalate	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Di-N-Butyl Phthalate	--	MG/KG	0.36 U	0.41 U	0.015 J	0.34 U	0.35 U	0.36 U	0.36 U
Di-N-Octylphthalate	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Fluoranthene	100	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.031 J
Fluorene	30	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Hexachlorobenzene	0.33	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
Hexachlorobutadiene	--	MG/KG	0.072 U	0.082 U	0.073 U	0.069 U	0.071 U	0.074 U	0.073 U
Hexachlorocyclopentadiene	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Hexachloroethane	--	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
Indeno(1,2,3-C,D)Pyrene	**0.5**	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
Isophorone	--	MG/KG	0.14 U	0.16 U	0.14 U	0.14 U	0.14 U	0.15 U	0.14 U
Naphthalene	12	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Nitrobenzene	--	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U
N-Nitrosodi-N-Propylamine	--	MG/KG	0.036 U	0.041 U	0.036 U	0.034 U	0.035 U	0.036 U	0.036 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-D1-01	BCS-D2-01	BCS-E1-01	BCS-E2-01	BCS-F1-01	BCS-F2-01	BCS-G1-01
		Sample Date:	01/04/2023	01/04/2023	01/11/2023	01/11/2023	02/17/2023	02/17/2023	02/17/2023
		Sample Depth (ft bls):	17 - 17.5	17 - 17.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	FD	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
N-Nitrosodiphenylamine	--	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Pentachlorophenol	0.8	MG/KG	0.29 U	0.33 U	0.29 U	0.27 U	0.28 U	0.29 U	0.29 U
Phenanthrene	100	MG/KG	0.36 U	0.41 U	0.0097 J	0.34 U	0.029 J	0.36 U	0.021 J
Phenol	0.33	MG/KG	0.36 U	0.41 U	0.36 U	0.34 U	0.35 U	0.36 U	0.36 U
Pyrene	100	MG/KG	0.36 U	0.41 U	0.011 J	0.34 U	0.35 U	0.36 U	0.03 J

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-G2-01	BCS-H1-01	BCS-H2-01	BCS-I1-01	BCS-I2-01
		Sample Date:	02/17/2023	02/17/2023	03/03/2023	03/03/2023	03/03/2023
		Sample Depth (ft bls):	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units					
1,2,4,5-Tetrachlorobenzene	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
1,4-Dioxane (P-Dioxane)	0.1	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
2,3,4,6-Tetrachlorophenol	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2,4,5-Trichlorophenol	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2,4,6-Trichlorophenol	--	MG/KG	0.15 U	0.14 U	0.15 U	0.15 U	0.15 U
2,4-Dichlorophenol	--	MG/KG	0.15 U	0.14 U	0.15 U	0.15 U	0.15 U
2,4-Dimethylphenol	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2,4-Dinitrophenol	--	MG/KG	0.29 UT	0.29 UT	0.29 UT	0.29 UT	0.29 UT
2,4-Dinitrotoluene	--	MG/KG	0.074 U	0.072 U	0.073 U	0.074 U	0.074 U
2,6-Dinitrotoluene	--	MG/KG	0.074 U	0.072 U	0.073 U	0.074 U	0.074 U
2-Chloronaphthalene	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2-Chlorophenol	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2-Methylnaphthalene	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2-Methylphenol (O-Cresol)	0.33	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2-Nitroaniline	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
2-Nitrophenol	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
3,3'-Dichlorobenzidine	--	MG/KG	0.15 U	0.14 U	0.15 U	0.15 U	0.15 U
3-Nitroaniline	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4,6-Dinitro-2-Methylphenol	--	MG/KG	0.29 UT	0.29 UT	0.29 UT	0.29 UT	0.29 UT
4-Bromophenyl Phenyl Ether	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4-Chloro-3-Methylphenol	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4-Chloroaniline	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4-Chlorophenyl Phenyl Ether	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4-Methylphenol (P-Cresol)	0.33	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4-Nitroaniline	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
4-Nitrophenol	--	MG/KG	0.74 U	0.72 U	0.73 U	0.74 U	0.74 U
Acenaphthene	20	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Acenaphthylene	100	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Acetophenone	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Anthracene	100	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Atrazine	--	MG/KG	0.15 U	0.14 U	0.15 U	0.15 U	0.15 U
Benzaldehyde	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-G2-01	BCS-H1-01	BCS-H2-01	BCS-I1-01	BCS-I2-01
		Sample Date:	02/17/2023	02/17/2023	03/03/2023	03/03/2023	03/03/2023
		Sample Depth (ft bls):	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units					
Benzo(A)Anthracene	1	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
Benzo(A)Pyrene	1	MG/KG	0.036 U	0.036 U	0.01 J	0.036 U	0.021 J
Benzo(B)Fluoranthene	1	MG/KG	0.036 U	0.036 U	0.011 J	0.036 U	0.028 J
Benzo(G,H,I)Perylene	100	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Benzo(K)Fluoranthene	0.8	MG/KG	0.036 U	0.036 U	0.0071 J	0.036 U	0.012 J
Benzyl Butyl Phthalate	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Biphenyl (Diphenyl)	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Bis(2-Chloroethoxy) Methane	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	--	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
Bis(2-Chloroisopropyl) Ether	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Bis(2-Ethylhexyl) Phthalate	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Caprolactam	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Carbazole	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Chrysene	1	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.022 J
Cresols, M & P	0.33	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Dibenz(A,H)Anthracene	0.33	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
Dibenzofuran	7	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Diethyl Phthalate	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Dimethyl Phthalate	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Di-N-Butyl Phthalate	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Di-N-Octylphthalate	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Fluoranthene	100	MG/KG	0.36 U	0.36 U	0.02 J	0.36 U	0.039 J
Fluorene	30	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Hexachlorobenzene	0.33	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
Hexachlorobutadiene	--	MG/KG	0.074 U	0.072 U	0.073 U	0.074 U	0.074 U
Hexachlorocyclopentadiene	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Hexachloroethane	--	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
Indeno(1,2,3-C,D)Pyrene	**0.5**	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.017 J
Isophorone	--	MG/KG	0.15 U	0.14 U	0.15 U	0.15 U	0.15 U
Naphthalene	12	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Nitrobenzene	--	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U
N-Nitrosodi-N-Propylamine	--	MG/KG	0.036 U	0.036 U	0.036 U	0.036 U	0.036 U

Table 2. Summary of Semivolatile Organic Compounds in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-G2-01	BCS-H1-01	BCS-H2-01	BCS-I1-01	BCS-I2-01
		Sample Date:	02/17/2023	02/17/2023	03/03/2023	03/03/2023	03/03/2023
		Sample Depth (ft bls):	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units					
N-Nitrosodiphenylamine	--	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Pentachlorophenol	0.8	MG/KG	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
Phenanthrene	100	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.022 J
Phenol	0.33	MG/KG	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Pyrene	100	MG/KG	0.36 U	0.36 U	0.019 J	0.36 U	0.036 J

Table 3. Summary of Metals in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-A1-01	BCS-A2-01	BCS-B1-01	BCS-B2-01	BCS-C1-01	BCS-C2-01	BCS-D1-01	BCS-D1-01	BCS-D2-01
		Sample Date:	12/13/2022	12/13/2022	12/13/2022	12/13/2022	12/20/2022	12/29/2022	01/04/2023	01/04/2023	01/04/2023
		Sample Depth (ft bls):	17 - 17.7	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5	17 - 17.5
		Normal Sample or Field Duplicate:	N	N	N	N	N	N	N	FD	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units									
Aluminum	--	MG/KG	40800	23200	9790	8880	8350	9970	7310	6880	8960
Antimony	--	MG/KG	0.98 U	0.94 U	1.1 U	0.87 U	0.96 U	1 U	0.9 U	0.88 U	0.95 U
Arsenic	13	MG/KG	1.7	2.6	2.8	1.4	2.6	1.7	1.8	1.8	3.9
Barium	350	MG/KG	152	101	32	80.9	30.1	49.1	25.8	25	42.8
Beryllium	7.2	MG/KG	1.6	1	0.42 J	0.48	0.42	0.58	0.33 J	0.32 J	0.45
Cadmium	2.5	MG/KG	0.98 U	0.15 J	1.1 U	0.1 J	0.96 U	1 U	0.9 U	0.88 U	0.95 U
Calcium	--	MG/KG	16200	10800	730	3340	833	2880	528	567	1560
Chromium III	**30**	MG/KG	**53.3**	**34.6**	13.6	21.7	11.9	24	8.9	8.9	19.2
Chromium, Hexavalent	1	MG/KG	2.3 U	2.3 U	2.3 U	2.2 U	2.3 U	2 U	2.2 U	2.1 U	2.5 U
Chromium, Total	**30**	MG/KG	**53.3**	**34.6**	13.6	21.7	11.9	24	8.9	8.9	19.2
Cobalt	--	MG/KG	11.2	9.3	5.8	17.2	5.6	8.2	4.3	4.4	7.4
Copper	50	MG/KG	19.8	27	12.4	21.8	12.6	21.8	9	9.1	16.6
Cyanide	27	MG/KG	0.24 U	1.5	0.27 U	0.27 U	0.27 U	0.24 U	0.23 U	0.25 U	0.25 U
Iron	--	MG/KG	32600	23600	15800	17400	14600	17200	11100	11300	19500
Lead	**63**	MG/KG	6.8	41.3	6.5	12.9	5.8	5.9	4.2	4.3	7.3
Magnesium	--	MG/KG	27600	14000	2410	6020	2970	5990	2490	2500	3230
Manganese	1600	MG/KG	485	448	360	453	365	400	303	319	520
Mercury	**0.18**	MG/KG	0.01 J	**0.2**	0.02	0.019	0.0095 J	0.016 U	0.017 U	0.018 U	0.019 U
Nickel	30	MG/KG	24.2	19.7	12	20.1	12.2	18.4	9.6	9.9	14.3
Potassium	--	MG/KG	494	1440	936	2270	965	1760	835	841	1350
Selenium	3.9	MG/KG	1.2 U	0.14 J	1.4 U	1.1 U	1.2 U	1.3 U	1.1 U	1.1 U	1.2 U
Silver	2	MG/KG	0.39 U	0.37 U	0.44 U	0.35 U	0.39 U	0.42 U	0.36 U	0.35 U	0.38 U
Sodium	--	MG/KG	2560	1350	50.9 J	206	50.5 J	242	55 J	68.6 J	106
Thallium	--	MG/KG	0.24 J	0.2 J	0.064 J	0.33 J	0.07 J	0.16 J	0.055 J	0.06 J	0.086 J
Vanadium	--	MG/KG	59	42	17.2	30.2	15.4	28.1	12.1	12.3	25
Zinc	109	MG/KG	55.1	86.4	28.8	52.6	34.6	38.9	21.8	22.4	39.3

Table 3. Summary of Metals in Soil, 586 Gerard Avenue, Bronx, New York

		Sample Designation:	BCS-E1-01	BCS-E2-01	BCS-F1-01	BCS-F1-02	BCS-F2-01	BCS-G1-01	BCS-G2-01	BCS-H1-01	BCS-H2-01
		Sample Date:	01/11/2023	01/11/2023	02/17/2023	02/24/2023	02/17/2023	02/17/2023	02/17/2023	02/17/2023	03/03/2023
		Sample Depth (ft bls):	15 - 15.5	15 - 15.5	15 - 15.5	16 - 16.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5	15 - 15.5
		Normal Sample or Field Duplicate:	N	N	N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units									
Aluminum	--	MG/KG	7320	5160	7510	NA	6550	7130	6570	5820	6210
Antimony	--	MG/KG	1.1 U	1 U	0.87 U	NA	0.9 U	0.79 U	0.86 U	0.84 U	0.88 U
Arsenic	13	MG/KG	1.4	1.4	1.8	NA	1.8	1.8	1.8	1.6	1.5
Barium	350	MG/KG	38.8	29.2	34.3	NA	29.5	35	29.5	27	31.2
Beryllium	7.2	MG/KG	0.46	0.31 J	0.36	NA	0.29 J	0.33	0.33 J	0.27 J	0.29 J
Cadmium	2.5	MG/KG	0.12 J	1 U	0.87 U	NA	0.9 U	0.79 U	0.86 U	0.84 U	0.88 U
Calcium	--	MG/KG	1390	847	812	NA	832	1660	851	770	855
Chromium III	**30**	MG/KG	20.7	9.5	9.4	NA	8.7	10.3	10.4	8.1	9.6
Chromium, Hexavalent	1	MG/KG	2.1 U	2 U	2.1 U	NA	2.2 U	2.2 U	2.2 U	2.1 U	2.2 U
Chromium, Total	**30**	MG/KG	20.7	9.5	9.4	NA	8.7	10.3	10.4	8.1	9.6
Cobalt	--	MG/KG	7.9	4	4.7	NA	4.3	4.7	4.7	4	4.4
Copper	50	MG/KG	20	8.1	9.3	NA	8.7	9.7	9.1	8.1	9.1
Cyanide	27	MG/KG	0.6	0.21 U	0.25 U	NA	0.27 U	0.25 U	0.26 U	0.26 U	0.26 U
Iron	--	MG/KG	15500	9840	12500	NA	11300	12500	12900	10200	11600
Lead	**63**	MG/KG	7	4.1	**116**	9.3	3.9	8.6	4.5	3.7	5.8
Magnesium	--	MG/KG	5110	2120	2690	NA	2380	2930	2470	2180	2470
Manganese	1600	MG/KG	415	324	346	NA	305	366	378	316	324
Mercury	**0.18**	MG/KG	0.018 U	0.017 U	0.016 U	NA	0.011 J	0.022	0.0096 J	0.0087 J	0.0094 J
Nickel	30	MG/KG	14.9	9.4	10.5	NA	9.5	10.3	10.6	9.4	9.9
Potassium	--	MG/KG	1200	926	970	NA	907	1060	1030	871	988
Selenium	3.9	MG/KG	1.4 U	1.2 U	1.1 U	NA	1.1 U	0.99 U	1.1 U	1 U	1.1 U
Silver	2	MG/KG	0.44 U	0.4 U	0.35 U	NA	0.36 U	0.32 U	0.34 U	0.34 U	0.35 U
Sodium	--	MG/KG	58.5 J	61.7 J	55.5 J	NA	81.2 J	103	78.8 J	57.9 J	66.9 J
Thallium	--	MG/KG	0.18 J	0.043 J	0.057 J	NA	0.049 J	0.064 J	0.053 J	0.045 J	0.056 J
Vanadium	--	MG/KG	29.3	10.2	14.4	NA	12.4	15.3	15.2	10.8	12.7
Zinc	109	MG/KG	34	22.1	24.1	NA	23.4	27.5	24.1	24.5	27

Table 3. Summary of Metals in Soil, 586 Gerard Avenue, Bronx, New York

	Sample Designation:		BCS-HS-01	BCS-HS-02	BCS-I1-01	BCS-I2-01	SCS-HS-01A	SCS-HS-01B	SCS-HS-01C
	Sample Date:		03/06/2023	03/10/2023	03/03/2023	03/03/2023	03/06/2023	03/06/2023	03/06/2023
	Sample Depth (ft bls):		27 - 27.5	28 - 28.5	15 - 15.5	15 - 15.5	27 - 27.5	27 - 27.5	27 - 27.5
	Normal Sample or Field Duplicate:		N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Unrestricted Use SCO	Units							
Aluminum	--	MG/KG	NA	NA	7030	6830	NA	NA	NA
Antimony	--	MG/KG	NA	NA	0.87 U	0.98 U	NA	NA	NA
Arsenic	13	MG/KG	NA	NA	1.9	1.7	NA	NA	NA
Barium	350	MG/KG	NA	NA	29.1	35.3	NA	NA	NA
Beryllium	7.2	MG/KG	NA	NA	0.31 J	0.35 J	NA	NA	NA
Cadmium	2.5	MG/KG	NA	NA	0.87 U	0.98 U	NA	NA	NA
Calcium	--	MG/KG	NA	NA	912	1000	NA	NA	NA
Chromium III	**30**	MG/KG	**30.8**	13.7	9.1	10.4	13.2	10.4	16.8
Chromium, Hexavalent	1	MG/KG	2.5 U	2.2 U	2.2 U	2.2 U	2.2 U	2.4 U	2.2 U
Chromium, Total	**30**	MG/KG	**30.8**	13.7	9.1	10.4	13.2	10.4	16.8
Cobalt	--	MG/KG	NA	NA	4.7	4.8	NA	NA	NA
Copper	50	MG/KG	NA	NA	9.8	10.1	NA	NA	NA
Cyanide	27	MG/KG	NA	NA	0.24 U	0.25 U	NA	NA	NA
Iron	--	MG/KG	NA	NA	12600	12400	NA	NA	NA
Lead	**63**	MG/KG	NA	NA	4.3	8.6	NA	NA	NA
Magnesium	--	MG/KG	NA	NA	2590	2600	NA	NA	NA
Manganese	1600	MG/KG	NA	NA	335	361	NA	NA	NA
Mercury	**0.18**	MG/KG	NA	NA	0.01 J	0.014 J	NA	NA	NA
Nickel	30	MG/KG	NA	NA	10.5	10.9	NA	NA	NA
Potassium	--	MG/KG	NA	NA	976	1090	NA	NA	NA
Selenium	3.9	MG/KG	NA	NA	1.1 U	1.2 U	NA	NA	NA
Silver	2	MG/KG	NA	NA	0.35 U	0.39 U	NA	NA	NA
Sodium	--	MG/KG	NA	NA	72.6 J	90.1 J	NA	NA	NA
Thallium	--	MG/KG	NA	NA	0.053 J	0.061 J	NA	NA	NA
Vanadium	--	MG/KG	NA	NA	13.2	14.6	NA	NA	NA
Zinc	109	MG/KG	NA	NA	29	30.8	NA	NA	NA

Table 4. Summary of Volatile Organic Compounds in Groundwater, 580 Gerard Avenue, Bronx, New York

Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units	Sample Designation:	MW-07	MW-07	MW-07	MW-08	MW-08	MW-08	RXMW-09
			Sample Date:	10/23/2023	10/23/2023	07/19/2024	10/23/2023	07/19/2024	10/23/2024	11/15/2023
			Normal Sample or Field Duplicate:	N	FD	N	N	N	N	N
1,1,1,2-Tetrachloroethane	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,1-Trichloroethane (TCA)	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1,2,2-Tetrachloroethane	5	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	1	UG/L		1.5 U	1.5 U	150 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
1,1-Dichloroethane	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,1-Dichloroethene	5	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloropropene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichlorobenzene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3-Trichloropropane	0.04	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4,5-Tetramethylbenzene	**5**	UG/L		**29**	**37**	200 U	2 U	**31**	**13**	**19**	**27**
1,2,4-Trichlorobenzene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,4-Trimethylbenzene	**5**	UG/L		**170**	**180**	250 U	2.5 U	**110**	**64**	**58**	**120**
1,2-Dibromo-3-Chloropropane	0.04	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	UG/L		2 U	2 U	200 U	2 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	3	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2-Dichloroethane	0.6	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	1	UG/L		1 U	1 U	100 U	1 U	1 U	1 U	1 U	1 U
1,3,5-Trimethylbenzene (Mesitylene)	**5**	UG/L		**40**	**42**	250 U	2.5 U	**39**	1.4 J	2.8	**44**
1,3-Dichlorobenzene	3	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,3-Dichloropropane	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Dichlorobenzene	3	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
1,4-Diethyl Benzene	--	UG/L		5.7	9.4	200 U	2 U	8.9	2	10	50
1,4-Dioxane (P-Dioxane)	0.35	UG/L		250 U	250 U	25000 UJ	250 U	250 U	250 UJ	250 U	250 U
2,2-Dichloropropane	5	UG/L		2.5 U	2.5 U	250 U	2.5 UJ	2.5 U	2.5 U	2.5 UJ	2.5 U
2-Chlorotoluene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Hexanone	50	UG/L		5 UJ	5 U	500 UJ	5 U	5 UJ	5 UJ	5 U	5 U
4-Chlorotoluene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Ethyltoluene	--	UG/L		39	42	200 U	2 U	58	6.8	7.4	62
Acetone	50	UG/L		5 U	5 U	500 U	5 U	4 J	5 U	5 U	25
Acrylonitrile	5	UG/L		5 UJ	5 UJ	500 U	5 U	5 U	5 U	5 U	5 U
Benzene	**1**	UG/L		0.5 U	0.5 U	50 U	**1.3**	0.5 U	0.63	0.84	0.5 U
Bromobenzene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromochloromethane	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Bromodichloromethane	50	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	50	UG/L		2 U	2 U	200 U	2 U	2 U	2 U	2 U	2 U
Bromomethane	5	UG/L		2.5 UJ	2.5 UJ	250 U	2.5 U	2.5 UJ	2.5 U	2.5 U	2.5 U
Carbon Disulfide	60	UG/L		5 U	5 U	500 U	5 U	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloroethane	5	UG/L		2.5 U	2.5 U	250 U	2.5 UJ	2.5 U	2.5 U	2.5 UJ	2.5 UJ

Table 4. Summary of Volatile Organic Compounds in Groundwater, 580 Gerard Avenue, Bronx, New York

Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units	Sample Designation:	MW-07	MW-07	MW-07	MW-08	MW-08	MW-08	RXMW-09
			Sample Date:	10/23/2023	10/23/2023	07/19/2024	10/23/2023	07/19/2024	10/23/2024	11/15/2023
			Normal Sample or Field Duplicate:	N	FD	N	N	N	N	N
Chloroform	7	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Chloromethane	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ
Cis-1,2-Dichloroethylene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Cis-1,3-Dichloropropene	--	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Cymene	5	UG/L		2.3 J	3	250 U	2.5 U	2.9	0.88 J	1.2 J	1.5 J
Dibromochloromethane	50	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromomethane	5	UG/L		5 U	5 U	500 U	5 U	5 U	5 U	5 U	5 U
Dichlorodifluoromethane	5	UG/L		5 U	5 U	500 U	5 UJ	5 U	5 U	5 UJ	5 UJ
Dichloroethylenes	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Diethyl Ether (Ethyl Ether)	--	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Ethylbenzene	**5**	UG/L		**5.1**	**6.4**	250 U	2.5 U	2.5 U	2.5 U	2.5 U	1.5 J
Hexachlorobutadiene	0.5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Isopropylbenzene (Cumene)	**5**	UG/L		**18**	**22**	250 U	2.5 U	3	**7.5**	**7.8**	**10**
m,p-Xylene	**5**	UG/L		4.6	**5.4**	250 U	2.5 U	2.5	2.5 U	2.5 U	4.8
Methyl Ethyl Ketone (2-Butanone)	50	UG/L		5 U	5 U	500 U	5 U	2.5 J	3.2 J	5 U	8.1
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	UG/L		5 U	5 U	500 UJ	5 U	5 U	5 UJ	5 U	5 U
Methylene Chloride	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Naphthalene	**10**	UG/L		**34**	**40**	250 U	2.5 U	3.2	6.8	3.2	9.5
N-Butylbenzene	**5**	UG/L		**7.2**	**9.6**	250 U	2.5 U	3.2	2.7	5	5
N-Propylbenzene	**5**	UG/L		**33**	**41**	250 U	2.5 U	**13**	**8.7**	**15**	**23**
O-Xylene (1,2-Dimethylbenzene)	5	UG/L		2 J	2.4 J	250 U	2.5 U	1.4 J	2.5 U	2.5 U	1.3 J
Sec-Butylbenzene	**5**	UG/L		**5.1**	**6.5**	250 U	2.5 U	2.9	3.2	**5.6**	4 J
Styrene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
T-Butylbenzene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Tert-Butyl Methyl Ether	10	UG/L		2.5 UJ	2.5 U	250 U	2.5 U	2.5 UJ	2.5 U	2.5 U	2.5 U
Tetrachloroethylene (PCE)	5	UG/L		0.21 J	0.24 J	50 U	0.5 U	0.36 J	0.5 U	0.5 U	0.5 U
Toluene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Total, 1,3-Dichloropropene (Cis And Trans)	0.4	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,2-Dichloroethene	5	UG/L		2.5 U	2.5 U	250 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Trans-1,3-Dichloropropene	--	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trans-1,4-Dichloro-2-Butene	5	UG/L		2.5 U	2.5 U	250 U	2.5 UJ	2.5 U	2.5 U	2.5 UJ	2.5 U
Trichloroethylene (TCE)	5	UG/L		0.5 U	0.5 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	5	UG/L		2.5 UJ	2.5 UJ	250 U	2.5 UJ	2.5 UJ	2.5 U	2.5 UJ	2.5 U
Vinyl Acetate	--	UG/L		5 U	5 U	500 U	5 U	5 U	5 U	5 U	5 UJ
Vinyl Chloride	2	UG/L		1 U	1 U	100 U	1 UJ	1 U	1 U	1 UJ	1 U
Xylenes	**5**	UG/L		**6.6 J**	**7.8 J**	250 U	2.5 U	3.9 J	2.5 U	2.5 U	**6.1 J**

Table 7. Summary of Soil Cleanup Objectives
580 Gerard Former Post Office Vehicle Repair Shop Site - NYSDEC BCP Site No. C203142
580-610 Gerard Avenue, Bronx, New York

Parameter	CAS Number	Units	Track 1 Soil Cleanup Objectives[1]	Track 2 Soil Cleanup Objectives[2]
Volatile Organic Compounds				
1,1,1-Trichloroethane	71-55-6	mg/kg	0.68	0.68
1,1-Dichloroethane	75-34-3	mg/kg	0.27	0.27
1,1-Dichloroethene	75-35-4	mg/kg	0.33	0.33
1,2,4-Trimethylbenzene	95-63-6	mg/kg	3.6	3.6
1,2-Dichlorobenzene	95-50-1	mg/kg	1.1	1.1
1,2-Dichloroethane	107-06-2	mg/kg	0.02	0.02
1,3,5-Trimethylbenzene	108-67-8	mg/kg	8.4	8.4
1,3-Dichlorobenzene	541-73-1	mg/kg	2.4	2.4
1,4-Dichlorobenzene	106-46-7	mg/kg	1.8	1.8
1,4-Dioxane	123-91-1	mg/kg	0.1	0.1
2-Butanone (MEK)	78-93-3	mg/kg	0.12	0.12
Acetone	67-64-1	mg/kg	0.05	0.05
Benzene	71-43-2	mg/kg	0.06	0.06
Carbon tetrachloride	56-23-5	mg/kg	0.76	0.76
Chlorobenzene	108-90-7	mg/kg	1.1	1.1
Chloroform	67-66-3	mg/kg	0.37	0.37
cis-1,2-Dichloroethene	156-59-2	mg/kg	0.25	0.25
Ethylbenzene	100-41-4	mg/kg	1	1
Methylene Chloride	75-09-2	mg/kg	0.05	0.05
MTBE	1634-04-4	mg/kg	0.93	0.93
Napthalene	91-20-3	mg/kg	12	12
n-Butylbenzene	104-51-8	mg/kg	12	12
n-Propylbenzene	103-65-1	mg/kg	3.9	3.9
sec-Butylbenzene	135-98-8	mg/kg	11	11
tert-Butylbenzene	98-06-6	mg/kg	5.9	5.9
Tetrachloroethene	127-18-4	mg/kg	1.3	1.3
Toluene	108-88-3	mg/kg	0.7	0.7
trans-1,2-Dichloroethene	156-60-5	mg/kg	0.19	0.19
Trichloroethene	79-01-6	mg/kg	0.47	0.47
Vinyl chloride	75-01-4	mg/kg	0.02	0.02
Xylenes (total)	1330-20-7	mg/kg	0.26	1.6
Semivolatile Organic Compounds				
2-Methylphenol	95-48-7	mg/kg	0.33	0.33
3-Methylphenol	108-39-4	mg/kg	0.33	0.33
4-Methylphenol	106-44-5	mg/kg	0.33	0.33
Acenaphthene	83-32-9	mg/kg	20	98
Acenaphthylene	208-96-8	mg/kg	100	100
Anthracene	120-12-7	mg/kg	100	100
Benzo[a]anthracene	56-55-3	mg/kg	1	1
Benzo[a]pyrene	50-32-8	mg/kg	1	1
Benzo[b]fluoranthene	205-99-2	mg/kg	1	1
Benzo[g,h,i]perylene	191-24-2	mg/kg	100	100
Benzo[k]fluoranthene	207-08-9	mg/kg	0.8	1.7
Chrysene	218-01-9	mg/kg	1	1
Dibenzo[a,h]anthracene	53-70-3	mg/kg	0.33	0.33
Dibenzofuran	132-64-9	mg/kg	7	59
Fluoranthene	206-44-0	mg/kg	100	100
Fluorene	86-73-7	mg/kg	30	100
Hexachlorobenzene	118-74-1	mg/kg	0.33	1.2
Indeno[1,2,3-cd]pyrene	193-39-5	mg/kg	0.5	0.5
Naphthalene	91-20-3	mg/kg	12	12
Pentachlorophenol	87-86-5	mg/kg	0.8	0.8
Phenanthrene	85-01-8	mg/kg	100	100
Phenol	108-95-2	mg/kg	0.33	0.33
Pyrene	129-00-0	mg/kg	100	100

Table 7. Summary of Soil Cleanup Objectives
580 Gerard Former Post Office Vehicle Repair Shop Site - NYSDEC BCP Site No. C203142
580-610 Gerard Avenue, Bronx, New York

Parameter	CAS Number	Units	Track 1 Soil Cleanup Objectives[1]	Track 2 Soil Cleanup Objectives[2]
Metals (Inorganics)				
Arsenic	7440-38-2	mg/kg	13	16
Barium	7440-39-3	mg/kg	350	400
Beryllium	7440-41-7	mg/kg	7.2	47
Cadmium	7440-43-9	mg/kg	2.5	4.3
Chromium	7440-47-3	mg/kg	30	180
Chromium, Hexavalent	18540-29-9	mg/kg	1	19
Chromium, Trivalent	16065-83-1	mg/kg	30	180
Copper	7440-50-8	mg/kg	50	270
Cyanide	57-12-5	mg/kg	27	27
Lead	7439-92-1	mg/kg	63	400
Manganese	7439-96-5	mg/kg	1600	2000
Mercury	7439-97-6	mg/kg	0.18	0.73
Nickel	7440-02-0	mg/kg	30	130
Selenium	7782-49-2	mg/kg	3.9	4
Silver	7440-22-4	mg/kg	2	8.3
Zinc	7440-66-6	mg/kg	109	2480
Polychlorinated biphenyls (PCBs)				
Polychlorinated biphenyls (PCBs) - total	1336-36-3	mg/kg	0.1	1
Pesticides and Herbicides				
2,4,5-TP	93-72-1	mg/kg	3.8	3.8
4,4'-DDD	72-54-8	mg/kg	0.0033	13
4,4'-DDE	72-55-9	mg/kg	0.0033	8.9
4,4'-DDT	50-29-3	mg/kg	0.0033	7.9
Aldrin	309-00-2	mg/kg	0.005	0.097
alpha-BHC	319-84-6	mg/kg	0.02	0.02
alpha-Chlordane	5103-71-9	mg/kg	0.094	2.9
beta-BHC	319-85-7	mg/kg	0.036	0.09
delta-BHC	319-86-8	mg/kg	0.04	0.25
Dieldrin	60-57-1	mg/kg	0.005	0.1
Endosulfan I	959-98-8	mg/kg	2.4	24
Endosulfan II	33213-65-9	mg/kg	2.4	24
Endosulfan sulfate	1031-07-8	mg/kg	2.4	24
Endrin	72-20-8	mg/kg	0.014	0.06
gamma-BHC (Lindane)	58-89-9	mg/kg	0.1	0.1
Heptachlor	76-44-8	mg/kg	0.042	0.38
Per- and Polyfluoroalkyl Substances (PFAS)				
Perfluorooctanoic Acid (PFOA)	335-67-1	µg/kg	1	1
Perfluorooctane Sulfonate (PFOS)	1763-23-1	µg/kg	1	1

Notes:

[1] Track 1 SCOs will be the NYSDEC Part 375 Unrestricted Use SCOs.

[1] Track 2 SCOs for the Track 2 areas are the lower of the NYSDEC Part 375 Protection of Groundwater or Restricted Residential Use SCOs.

[2] Track 1 and Track 2 SCOs for PFAS are based on the NYSDEC Sampling, Analysis and Assessment of PFAS Guidelines dated January 2021. If PFOA or PFOS is detected in any sample at or above the SCO then the soil will be tested by SPLP and the leachate analyzed for PFAS. The SCO for SPLP testing will be 10 ppt.

mg/kg - milligrams per kilogram

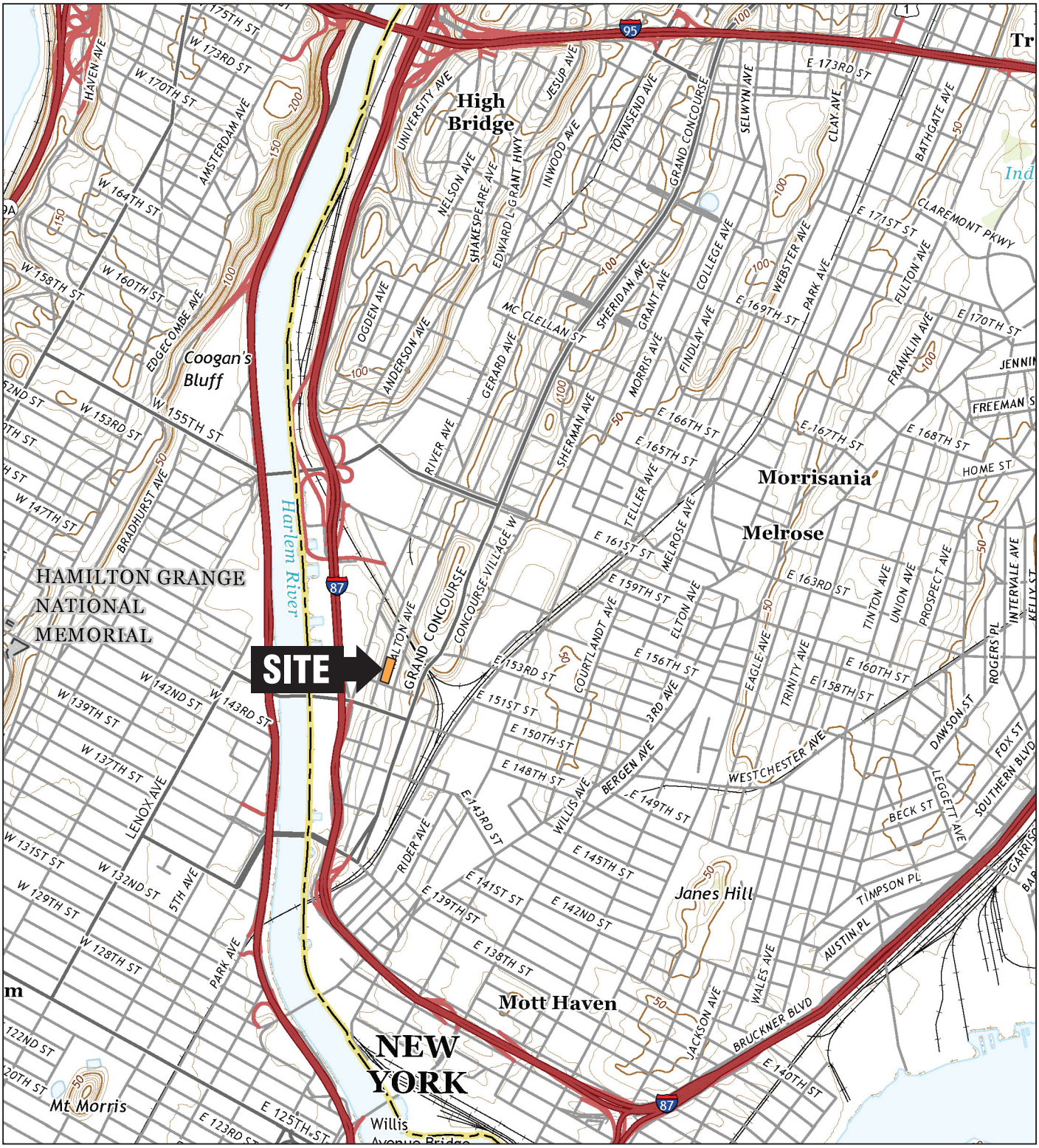
µg/kg - micrograms per kilogram

NYSDEC - New York State Department of Environmental Conservation

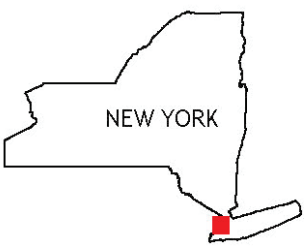
SCOs - Soil Cleanup Objectives

SPLP - Synthetic Precipitation LeachingProcedure

FIGURES



QUADRANGLE LOCATION



SOURCE:
USGS; 2019, Central Park, NY-NJ
7.5 Minute Topographic Quadrangle

N

0 2000'

Title:

SITE LOCATION MAP

580 GERARD AVENUE
BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: A.I.	Date: 02MAY24
Prepared by: G.M.	Scale: AS SHOWN
Project Mgr: J.L.	Project: 3523.0001Y000
File: 3523.0001Y123.01.CDR	

FIGURE 1

\3523\Y0001Y\107\3523.0001Y107.01.CDR

GERARD AVENUE

GRANITE CURB
TREE PIT
TREE PIT
3"TREE
CONCRETE SIDEWALK
6"TREE
6"TREE
SIGN
OGV
13'±
GRANITE CURB

35.37'
322.64'
89°57'39"
90°2'21"
93°20'35"
90°0'0"

580 GERARD FORMER POST OFFICE VEHICLE REPAIR SHOP
BROWNFIELD CLEA M
SITE No.:C203142
TAX ID: P/O BLOCK 235
PORTION OF 580 GERARD AVENUE a/k/a 586 GERARD NUE, BRONX, N.Y. 10451
ACREAGE :0.6918

CONDITIONAL TRACK 1 AREA
ACREAGE: 0.6218

TRACK 2 AREA
ACREAGE: 0.0700

LIMIT OF ENVIRONMENTAL EASEMENT

LIMIT OF ENVIRONMENTAL EASEMENT

LIMIT OF ENVIRONMENTAL EASEMENT

LIMIT OF ENVIRONMENTAL EASEMENT

ROOFING OVER PARAPETS 0.6'±

No.620

1 STORY BRICK BUILDING

89.38'
79.36'
82.58'
92.56'
92.64'
0.08'

87°11'42"
90°2'50"
89°57'10"
89°27'14"
36.20'
63.15'
83.16'
11.43'
89°57'52"
89°58'13"
90°17'22"
89°50'16"
89°51'48"
89°15'38"
90°36'6"
90°3'19"
8.89'
12.49'
10.01'
3.01'
3.78'
9.21'
90°0'0"
83.34'
48"TREE
8.14'
9.50'
26.94'
1.55'
90°2'2"
90°3'22"
136.98'
166.44'
89°27'43"
90°27'57"

C.L.FENCE
113.45'
1 STORY BRICK GARAGE
DIRT YARD
OVERGROWN YARD
CONCRETE PATIO
WIRE FENCE
YARD
FLAG POLE
WOOD FENCE
PVC FENCE ON CONC. WALL
PVC FENCE
WOOD FENCE
CONCRETE PATIO

BLOCK 2353

3 STORY BRICK BUILDING No.587	3 STORY BRICK BUILDING No.589	3 STORY BRICK BUILDING No.591	3 STORY BRICK BUILDING No.593	3 STORY BRICK & STUCCO BUILDING No.595	3 STORY BRICK STONE BUILDING No.597	3 STORY BRICK BUILDING No.599	3 STORY BRICK BUILDING No.601	3 STORY BRICK BUILDING No.603	3 STORY BRICK BUILDING No.605	3 STORY BRICK BUILDING No.607	2 STORY FRAME BUILDING No.609	2 STORY FRAME BUILDING No.611	2 STORY FRAME BUILDING No.613	2 STORY FRAME BUILDING No.615	3 STORY FRAME BUILDING No.617	3 STORY BRICK BUILDING No.621	3 STORY BRICK BUILDING No.623	3 STORY BRICK BUILDING No.625	3 STORY BRICK BUILDING No.627	3 STORY BRICK BUILDING No.629

87°56'14"

WALTON AVENUE

20' 0 20'

LEGEND

- BCP SITE BOUNDARY
- CONDITIONAL TRACK 1 AREA
- TRACK 2 AREA
- LIMIT OF ENVIRONMENTAL EASEMENT
- BCP BROWNFIELD CLEANUP PROGRAM

Title:

SITE LAYOUT MAP

580 GERARD AVENUE
BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: A.I.	Date: 07MAY24	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	2
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y123.02.DWG		

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BCS-A1-01	12/13/2022
Depth (ft bls)	17 - 17.7
Metals	
Chromium III	**53.3**
Chromium, Total	**53.3**

BCS-A2-01	12/13/2022
Depth (ft bls)	17 - 17.5
SVOCs	
Ideno(1,2,3-C,D)Pyrene	**0.65**
Metals	
Chromium III	**34.6**
Chromium, Total	**34.6**
Mercury	**0.2**

GERARD AVENUE

GRANITE CURB
TREE PIT
CONCRETE SIDEWALK
6"TREE
SIGN
OGV
-3"±

322.64'

580 GERARD FORMER POST OFFICE VEHICLE REPAIR SHOP
BROWNFIELD CLEANUP PROGRAM
SITE No.:C203142
TAX ID: P/O BLOCK 2353 LOT 1
PORTION OF 580 GERARD AVENUE a/k/a 586 GERARD AVENUE, BRONX, N.Y. 10451
ACREAGE :0.6918

CONDITIONAL TRACK 1 AREA
ACREAGE: 0.6218

TRACK 2 AREA
ACREAGE: 0.0700

BCS-A1-01
BCS-A2-01

LIMIT OF ENVIRONMENTAL EASEMENT

35.37' 89.38' 79.36' 82.58' 36.20' 10.01' 3.01' 3.78' 63.15' 11.43' 83.16' 8.89' 2.49' 9.50' 26.94' 1.55' 136.98' 166.44' 92.56' 92.64' 0.08'

93°20'35" 89°57'09" 90°2'21" 87°11'42" 90°2'50" 89°57'10" 89°27'14" 90°0'0" 89°57'54" 89°58'13" 90°17'22" 89°51'48" 90°50'6" 89°15'38" 90°36'6" 90°3'19" 90°2'2" 90°0'0" 90°3'22" 89°27'43" 90°27'57"

1 STORY BRICK GARAGE
DIRT YARD
OVERGROWN YARD
C.L.FENCE
CONCRETE PATIO
WIRE FENCE
FLAG POLE
WOOD FENCE
48"TREE
PVC FENCE ON CONC. WALL
PVC FENCE
CONCRETE PATIO
ROOFING OVER PARAPETS 0.62'
No.620
1 STORY BRICK BUILDING

BLOCK 2353

3 STORY BRICK BUILDING No.587
3 STORY BRICK BUILDING No.589
3 STORY BRICK BUILDING No.591
3 STORY BRICK BUILDING No.593
3 STORY BRICK & STUCCO BUILDING No.595
3 STORY BRICK STONE BUILDING No.597
3 STORY BRICK BUILDING No.599
3 STORY BRICK BUILDING No.601
3 STORY BRICK BUILDING No.603
3 STORY BRICK BUILDING No.605
3 STORY BRICK BUILDING No.607
2 STORY FRAME BUILDING No.609
2 STORY FRAME BUILDING No.611
2 STORY FRAME BUILDING No.613
2 STORY FRAME BUILDING No.615
3 STORY FRAME BUILDING No.617
3 STORY BRICK BUILDING No.621
3 STORY BRICK BUILDING No.623
3 STORY BRICK BUILDING No.625
3 STORY BRICK BUILDING No.627
3 STORY BRICK BUILDING No.629

87°56'14"

WALTON AVENUE

LEGEND

- BCP SITE BOUNDARY
- CONDITIONAL TRACK 1 AREA
- TRACK 2 AREA
- LIMIT OF ENVIRONMENTAL EASEMENT
- BCP — BROWNFIELD CLEANUP PROGRAM
- ENDPOINT SAMPLE

Parameter	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	Units
VOCs	ND	mg/kg
SVOCs		mg/kg
Ideno(1,2,3-C,D)Pyrene	**0.5**	mg/kg
Metals		
Chromium III	**30**	mg/kg
Chromium, Total	**30**	mg/kg
Mercury	**0.18**	mg/kg
PCBs	ND	mg/kg
Pesticides	ND	mg/kg
PFAS	ND	ug/kg

mg/kg – MILLIGRAMS PER KILOGRAM
ug/kg – MICROGRAMS PER KILOGRAM
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
– – NO NYSDEC PART 375 SOIL CLEANUP OBJECTIVES AVAILABLE
J – ESTIMATED VALUE
VOCs – VOLATILE ORGANIC COMPOUNDS
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
PCBs – POLYCHLORINATED BIPHELYLS
PFAS – PER–AND POLYFLUOROALKYL SUBSTANCES
ND – NO DETECTION
FT BLS – FEET BELOW LAND SURFACE

20' 0 20'

Title:

REMAINING SOIL SAMPLE EXCEEDANCES

580 GERARD AVENUE, BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: A.I.	Date: 07MAY24	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	3
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y123.02.DWG		

V:\CAD\PROJECTS\3523Y\0001Y\123\3523.0001Y123.02.DWG

GERARD AVENUE

MW-08	10/23/2023	07/19/2024	10/23/2024
VOCs			
1,2,4,5-Tetramethylbenzene	**31**	**13**	**19**
1,2,4-Trimethylbenzene	**110**	**64**	**58**
1,3,5-Trimethylbenzene (Mesitylene)	**39**	NE	NE
Isopropylbenzene (Cumene)	NE	**7.5**	**7.8**
N-Propylbenzene	**13**	**8.7**	**15**
Sec-Butylbenzene	NE	NE	**5.6**

MW-07	10/23/2023	10/23/2023 DUP	07/19/2024	10/23/2024
VOCs				
1,2,4,5-Tetramethylbenzene	**29**	**37**	ND	ND
1,2,4-Trimethylbenzene	**170**	**180**	ND	ND
1,3,5-Trimethylbenzene (Mesitylene)	**40**	**42**	ND	ND
Benzene	ND	ND	ND	**1.3**
Ethylbenzene	**5.1**	**6.4**	ND	ND
Isopropylbenzene (Cumene)	**18**	**22**	ND	ND
m,p-Xylene	NE	**5.4**	ND	ND
Naphthalene	**34**	**40**	ND	ND
N-Butylbenzene	**7.2**	**9.6**	ND	ND
N-Propylbenzene	**33**	**41**	ND	ND
Sec-Butylbenzene	**5.1**	**6.5**	ND	ND
Xylenes	**6.6 J**	**7.8 J**	ND	ND

RXMW-04	07/15/2021
VOCs	
n-Butylbenzene	29
sec-Butylbenzene	9.8
Isopropylbenzene	24
n-Propylbenzene	55
1,3,5-Trimethylbenzene	140
1,2,4-Trimethylbenzene	360

RXMW-09	11/15/2023
VOCs	
1,2,4,5-Tetramethylbenzene	27
1,2,4-Trimethylbenzene	120
1,3,5-Trimethylbenzene (Mesitylene)	44
Isopropylbenzene (Cumene)	10
N-Propylbenzene	23
Xylenes	6.1 J

580 GERARD FORMER POST OFFICE VEHICLE REPAIR SHOP
BROWNFIELD CLEANUP PROGRAM
SITE No.:C203142
TAX ID: P/O BLOCK 2353 LOT 1
PORTION OF 580 GERARD AVENUE a/k/a 580 GERARD AVENUE, BRONX, N.Y. 10451
ACREAGE :0.6918

TRACK 2 AREA
ACREAGE: 0.0700

CONDITIONAL TRACK 1 AREA
ACREAGE: 0.6218

322.64' | 35.37' | 89.38' | 79.36' | 82.58' | 92.64' | 0.08' | 10.01' | 3.01' | 3.78' | 36.20' | 63.15' | 83.16' | 11.43' | 9.21' | 83.34' | 8.85' | 12.49' | 9.50' | 26.94' | 1.55' | 136.98' | 166.44' | 113.45'

RXMW-07 RXMW-08 RXMW-09 RXSB-06/RXMW-04

GRANITE CURB | TREE PIT | TREE PIT | 3"TREE | CONCRETE SIDEWALK | 6"TREE | 6"TREE | SIGN | OGV | GRANITE CURB

1 STORY BRICK GARAGE | DIRT YARD | OVERGROWN YARD | C.L.FENCE | CONCRETE PATIO | WIRE FENCE | FLAG POLE | WOOD FENCE | 48"TREE | PVC FENCE ON CONC. WALL | PVC FENCE | CONCRETE PATIO

BLOCK 2353

3 STORY BRICK BUILDING No.587 | 3 STORY BRICK BUILDING No.589 | 3 STORY BRICK BUILDING No.591 | 3 STORY BRICK BUILDING No.593 | 3 STORY BRICK & STUCCO BUILDING No.595 | 3 STORY BRICK STONE BUILDING No.597 | 3 STORY BRICK BUILDING No.599 | 3 STORY BRICK BUILDING No.601 | 3 STORY BRICK BUILDING No.603 | 3 STORY BRICK BUILDING No.605 | 3 STORY BRICK BUILDING No.607 | 2 STORY FRAME BUILDING No.609 | 2 STORY FRAME BUILDING No.611 | 2 STORY FRAME BUILDING No.613 | 2 STORY FRAME BUILDING No.615 | 3 STORY FRAME BUILDING No.617 | 3 STORY BRICK BUILDING No.621 | 3 STORY BRICK BUILDING No.623 | 3 STORY BRICK BUILDING No.625 | 3 STORY BRICK BUILDING No.627 | 3 STORY BRICK BUILDING No.629

WALTON AVENUE

LEGEND

- BCP SITE BOUNDARY
- VOC HOT SPOT AREA (EXCAVATION TO 27 FEET BLS) AND IN SITU ORC ADVANCED® TREATMENT AREA
- TRACK 2 AREA
- RXSB-04/RXMW-03 — RI SOIL BORING AND GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- PERMANENT INJECTION WELL LOCATION
- RXMW-08 — GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- RXMW-9 — TEMPORARY GROUNDWATER MONITORING POINT LOCATION AND DESIGNATION
- TEMPORARY INJECTION LOCATION
- 3 — LINE OF EQUAL GROUNDWATER ELEVATION IN FEET (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION
- 15 FOOT RADIUS OF INFLUENCE OF PETROFIX™ TREATMENT
- 5 FOOT RADIUS OF INFLUENCE OF PETROFIX™ TREATMENT

BCP	BROWNFIELD CLEANUP PROGRAM
BLS	BELOW LAND SURFACE
NYSDEC	NEW YORK STATE DEPARTMENT OF ENNRIONMENTAL CONSERVATION
RI	REMEDIAL INVESTIGATION
UUSCOs	PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES
VOCs	VOLATILE ORGANIC COMPOUNDS

Parameter	NYSDEC AWQSGV	Units
VOCs		
1,2,4,5-Tetramethylbenzene	**5**	µg/L
1,2,4-Trimethylbenzene	**5**	µg/L
1,3,5-Trimethylbenzene (Mesitylene)	**5**	µg/L
Ethylbenzene	**5**	µg/L
Isopropylbenzene (Cumene)	**5**	µg/L
m,p-Xylene	**5**	µg/L
Naphthalene	**10**	µg/L
N-Butylbenzene	**5**	µg/L
N-Propylbenzene	**5**	µg/L
Sec-Butylbenzene	**5**	µg/L
Xylenes	**5**	µg/L

Concentrations in µg/L
µg/L - Micrograms per liter
NYSDEC - New York State Department of Environmental Conservation
AWQSGVs - Ambient Water-Quality Standards and Guidance Values
-- - No NYSDEC AWQSGV available
J - Estimated value
DUP - Duplicate Sample
VOCs - Volatile Organic Compounds
NE - No exceedances
ND - No detection

20' 0 20'

Title:

GROUNDWATER MONITORING WELLS AND TREATMENT AREA MAPS

580 GERARD AVENUE
BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: A.I.	Date: 12NOV24	FIGURE 4
Prepared by: B.H.C.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y123.02.DWG		

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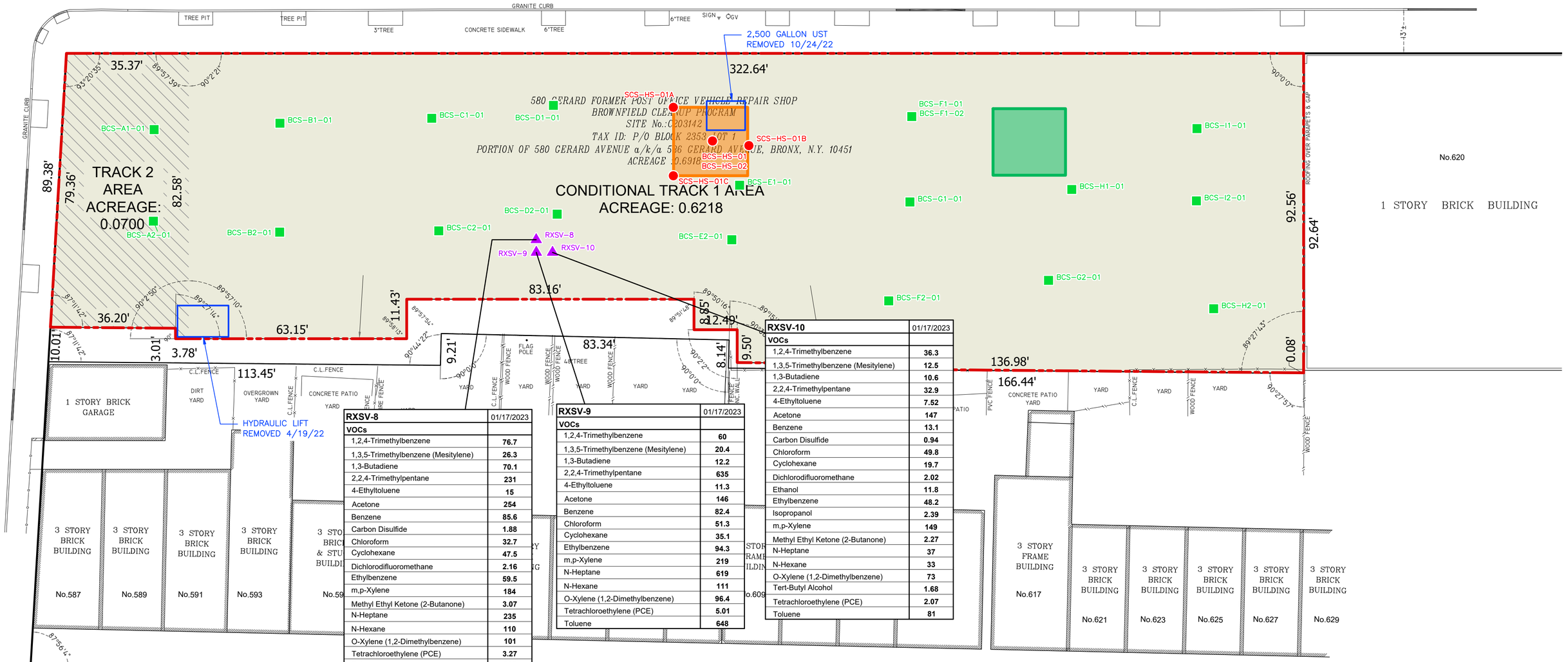
GERARD AVENUE



RXSV-8	01/17/2023
VOCs	
1,2,4-Trimethylbenzene	76.7
1,3,5-Trimethylbenzene (Mesitylene)	26.3
1,3-Butadiene	70.1
2,2,4-Trimethylpentane	231
4-Ethyltoluene	15
Acetone	254
Benzene	85.6
Carbon Disulfide	1.88
Chloroform	32.7
Cyclohexane	47.5
Dichlorodifluoromethane	2.16
Ethylbenzene	59.5
m,p-Xylene	184
Methyl Ethyl Ketone (2-Butanone)	3.07
N-Heptane	235
N-Hexane	110
O-Xylene (1,2-Dimethylbenzene)	101
Tetrachloroethylene (PCE)	3.27
Toluene	355

RXSV-9	01/17/2023
VOCs	
1,2,4-Trimethylbenzene	60
1,3,5-Trimethylbenzene (Mesitylene)	20.4
1,3-Butadiene	12.2
2,2,4-Trimethylpentane	635
4-Ethyltoluene	11.3
Acetone	146
Benzene	82.4
Chloroform	51.3
Cyclohexane	35.1
Ethylbenzene	94.3
m,p-Xylene	219
N-Heptane	619
N-Hexane	111
O-Xylene (1,2-Dimethylbenzene)	96.4
Tetrachloroethylene (PCE)	5.01
Toluene	648

RXSV-10	01/17/2023
VOCs	
1,2,4-Trimethylbenzene	36.3
1,3,5-Trimethylbenzene (Mesitylene)	12.5
1,3-Butadiene	10.6
2,2,4-Trimethylpentane	32.9
4-Ethyltoluene	7.52
Acetone	147
Benzene	13.1
Carbon Disulfide	0.94
Chloroform	49.8
Cyclohexane	19.7
Dichlorodifluoromethane	2.02
Ethanol	11.8
Ethylbenzene	48.2
Isopropanol	2.39
m,p-Xylene	149
Methyl Ethyl Ketone (2-Butanone)	2.27
N-Heptane	37
N-Hexane	33
O-Xylene (1,2-Dimethylbenzene)	73
Tert-Butyl Alcohol	1.68
Tetrachloroethylene (PCE)	2.07
Toluene	81

WALTON AVENUE

LEGEND

- BCP SITE BOUNDARY
- EXCAVATION UP TO 17 FEET BLS
- VOC HOT SPOT AREA (EXCAVATION TO 27 FEET BLS)
- CHROMIUM HOT SPOT AREA (EXCAVATION TO 28 FEET BLS)
- TRACK 2 AREA
- SOIL VAPOR SAMPLE
- CHROMIUM HOTSPOT ENDPOINT SAMPLE
- ENDPOINT SAMPLE
- BCP — BROWNFIELD CLEANUP PROGRAM
- UST — UNDERGROUND STORAGE TANK
- BLS — BELOW LAND SURFACE
- VOC — VOLATILE ORGANIC COMPOUND

Concentrations in µg/m^3

µg/m^3 - Micrograms per cubic meter

VOCs - Volatile Organic Compounds

ND - Compound was analyzed for but not detected

20' 0 20'

Title:

SOIL VAPOR SAMPLE DETECTIONS

580 GERARD AVENUE
BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: J.L.	Date: 26NOV24	FIGURE 5
Prepared by: B.H.C.	Scale: AS SHOWN	
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y123.02.DWG		

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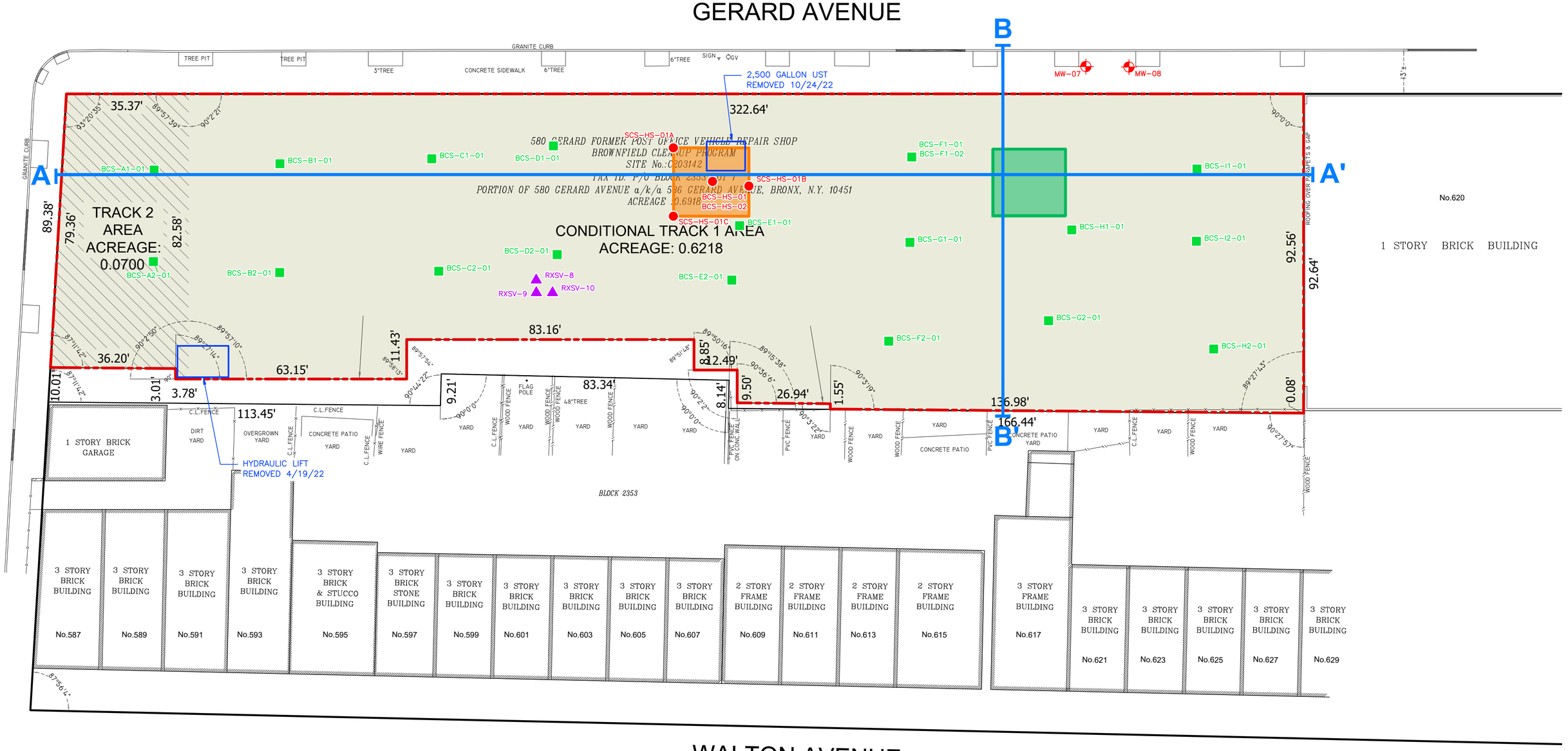
GERARD AVENUE



WALTON AVENUE

LEGEND

- BCP SITE BOUNDARY
- EXCAVATION TO 17 FEET BLS
- VOC HOT SPOT AREA (EXCAVATION TO 27 FEET BLS)
- CHROMIUM HOT SPOT (EXCAVATION TO 28 FEET BLS)
- TRACK 2 AREA
- SOIL VAPOR SAMPLE
- CHROMIUM HOTSPOT ENDPOINT SAMPLE
- ENDPOINT SAMPLE
- BCP — BROWNFIELD CLEANUP PROGRAM
- UST — UNDERGROUND STORAGE TANK
- BLS — BELOW LAND SURFACE
- VOC — VOLATILE ORGANIC COMPOUND
- MW-07 — GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- A — A' SECTION LINE

20' 0 20'

Title:

LINES OF SECTION

580 GERARD AVENUE
BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: A.I.	Date: 28AUG24	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	6A
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y123.02.DWG		

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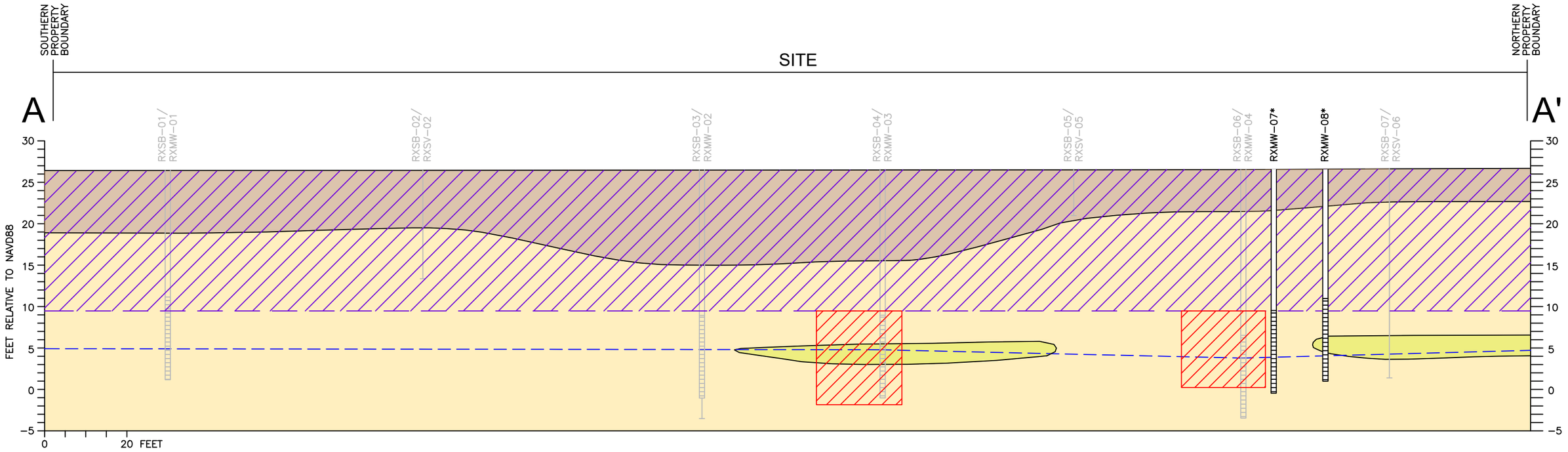
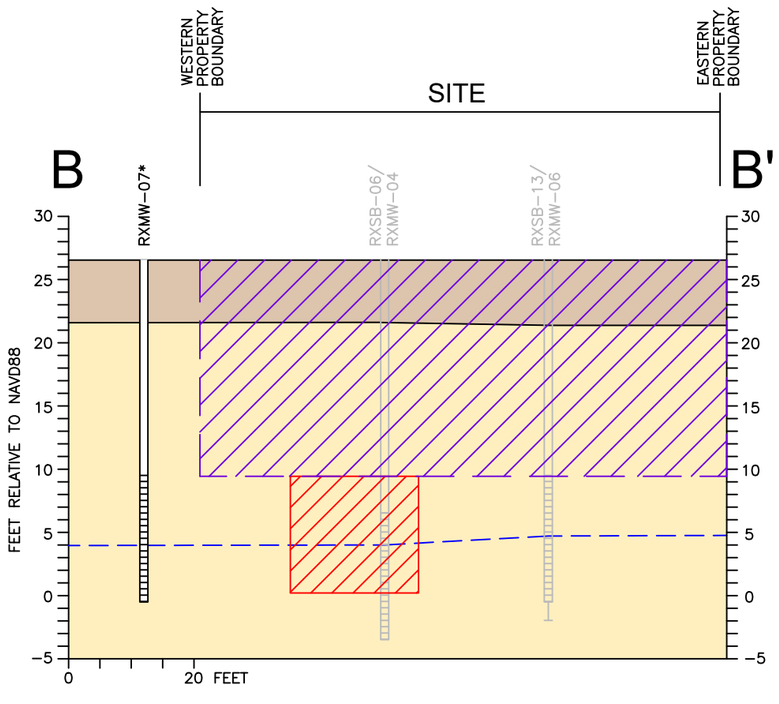
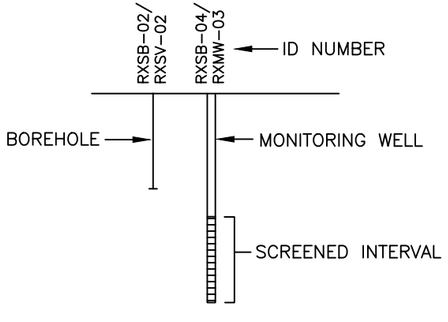




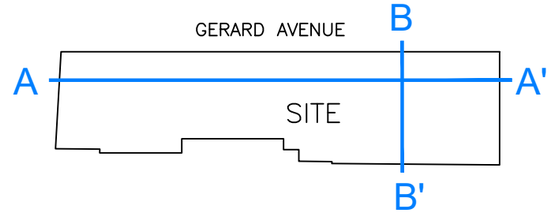
LEGEND

- FILL MATERIAL CONSISTING OF VARYING AMOUNTS OF SAND, GRAVEL, COBBLE, BRICK, GLASS, AND WOOD
- PRIMARILY SAND WITH VARYING AMOUNTS OF SILT AND/OR GRAVEL
- PRIMARILY SILT WITH VARYING AMOUNTS OF SAND AND/OR GRAVEL
- GROUNDWATER ELEVATION AS MEASURED IN MONITORING WELLS
- GENERALIZED EXCAVATION AREA
- HOT SPOT EXCAVATION



NOTES

1. GROUNDWATER ELEVATIONS MEASURED ON JULY 15, 2021 AND JULY 16, 2021 DURING REMEDIAL INVESTIGATION.
2. NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988.
3. * = PROJECTED MONITORING WELLS
4. FORMER WELLS AND BORINGS ARE REPRESENTED IN GRAY.



Title:

GENERALIZED GEOLOGIC CROSSESCTIONS

FORMER POST OFFICE VEHICLE REPAIR SHOP
586 GERARD AVENUE
BRONX, NEW YORK

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: J.L.	Date: 12/19/2024	FIGURE
Prepared by: B.H.C.	Scale: AS SHOWN	6B
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y123.03.DWG		

V:\CAD\PROJECTS\3523Y0001Y123\3523.0001Y123.03.DWG BCICIO

APPENDICES

A. Environmental Easement
B. List of Site Contacts
C. Soil Boring and Monitoring Well Construction Logs
D. Excavation Work Plan
E. Health and Safety Plan (including CAMP)
F. Quality Assurance Project Plan/ Field Sampling Plan
G. Site Management Forms
H. Remedial Party/Owner Responsibilities
I. SiteWise Analysis

APPENDIX A

Environmental Easement

KNAUF SHAW LLP
2600 Innovation Square
100 South Clinton Avenue
Rochester, New York 14604
nyenvlaw.com

LINDA R. SHAW
ATTORNEY AT LAW

T 585.546.8430
C 585.414.3122
lshaw@nyenvlaw.com

August 6, 2024

VIA ELECTRONIC MAIL

Cheryl Salem
NYS Department of Environmental Conservation
Office of General Counsel
625 Broadway
Albany, New York

RE: Environmental Easement
580 Gerard Former Post Office Vehicle Repair Shop
C203142

Dear Ms. Salem:

The Environmental Easement for the above-referenced BCP Site has been recorded. Enclosed please find my affirmation in support of mailing the municipal notices, copies of the letters that have been mailed to the municipality, which included the recorded easement, and your copy of the recorded easement.

Please do not hesitate to contact me with any questions. Thank you.

Sincerely,

KNAUF SHAW LLP

LINDA R. SHAW, ESQ.

Enclosure

ec: Nigel Crawford, NYS DEC Project Manager
Aldie Levine, NYS DEC Project Attorney

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

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

2024062800170001003E4749

RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 11**

Document ID: 2024062800170001 Document Date: 05-20-2024 Preparation Date: 07-11-2024
Document Type: EASEMENT
Document Page Count: 10

PRESENTER:
KENSINGTON VANGUARD NATIONAL LAND SERVICES
41 MADISON AVENUE, 21ST FLOOR
TITLE NO.5197420
NEW YORK, NY 10010
212-532-8686

RETURN TO:
KENSINGTON VANGUARD NATIONAL LAND SERVICES
41 MADISON AVENUE, 21ST FLOOR
TITLE NO.5197420
NEW YORK, NY 10010
212-532-8686

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BRONX	2353	1	Entire Lot	586 GERARD AVENUE

Property Type: APARTMENT BUILDING

CROSS REFERENCE DATA

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

PARTIES

GRANTOR/SELLER:
SB GERARD AVENUE, LLC
C/O: SILVERBACK ACQUISITIONS AND DEVELOPMENT LLC, 40 WEST 57TH STREET, 29TH
NEW YORK, NY 10019

GRANTEE/BUYER:
THE PEOPLE OF THE STATE OF NEW YORK
625 BROADWAY
ALBANY, NY 12233-1500

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	87.00
Affidavit Fee:	$	0.00

Filing Fee: $ 0.00

NYC Real Property Transfer Tax: $ 0.00

NYS Real Estate Transfer Tax: $ 0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 07-12-2024 11:46
City Register File No.(CRFN): **2024000178560**

City Register Official Signature

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

THIS INDENTURE made as of the this 20th day of May, 2024, between Owner, SB Gerard Avenue, LLC, having an office at c/o Silverback Acquisitions and Development LLC, 40 West 57th Street, 29th Floor, New York, New York 10019 (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

WHEREAS, Grantor, is the owner of real property located at the address of 580 Gerard Avenue a/k/a 586 Gerard Avenue in the City of New York, County of Bronx and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 2353 Lot 1, being the same as that property conveyed to Grantor by deed dated September 02, 2020 and recorded in the City Register of the City of New York as CRFN # 2020000269434. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.692 +/- acres, and is hereinafter more fully described in the Land Title Survey dated June 08, 2023 and revised November 6, 2023, prepared by Vincent M. Teutonico, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is

extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C203142-12-20, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

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

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

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

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

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

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

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

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

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

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

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

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

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

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

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

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

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

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

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

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

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

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

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

Parties shall address correspondence to:

Site Number: C203142
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified

mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

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

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

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

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

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

Remainder of Page Intentionally Left Blank

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

SB Gerard Avenue, LLC:

By: Adam Roman

Print Name: Adam Roman

Title: Authorized Signatory Date: 5/8/24

Grantor's Acknowledgment

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

On the 8th day of May, in the year 2024 before me, the undersigned, personally appeared Adam Roman personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New York

JENNIFER PENA
Notary Public, State of New York
No. 01PE6152723
Qualified in New York County
Commission Expires 9-18-26

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

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

Grantee's Acknowledgment

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

On the 20th day of May, in the year 2024, before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Cheryl A. Salem
Notary Public - State of New York

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

SCHEDULE "A" PROPERTY DESCRIPTION

BCP SITE/ENVIRONMENTAL EASEMENT AREA LEGAL DESCRIPTION

BEGINNING AT THE INTERSECTION FORMED BY THE NORTH SIDE OF EAST 150th. STREET WITH

THE EAST SIDE OF GERARD AVENUE;

THENCE NORTH ALONG THE EAST SIDE OF SAID GERARD AVENUE A DISTANCE OF 358.00 FEET;

THENCE EAST WITH AN INTERIOR ANGLE OF 90°00'00" A DISTANCE OF 92.56 FEET;

THENCE SOUTH WITH AN INTERIOR ANGLE OF 89°27'43" A DISTANCE OF 136.98 FEET;

THENCE WEST WITH AN INTERIOR ANGLE OF 90°03'19" A DISTANCE OF 1.55 FEET;

THENCE SOUTH WITH AN EXTERIOR ANGLE OF 90°03'22" A DISTANCE OF 26.94 FEET;

THENCE WEST WITH AN INTERIOR ANGLE OF 90°36'06" A DISTANCE OF 9.50 FEET;

THENCE SOUTH WITH AN EXTERIOR ANGLE OF 90°02'02" A DISTANCE OF 12.49 FEET;

THENCE WEST WITH AN INTERIOR ANGLE OF 89°50'16" A DISTANCE OF 8.85 FEET;

THENCE SOUTH WITH AN EXTERIOR ANGLE OF 89°51'48" A DISTANCE OF 83.16 FEET;

THENCE EAST WITH AN EXTERIOR ANGLE OF 89°57'54" A DISTANCE OF 11.43 FEET;

THENCE SOUTH WITH AN INTERIOR ANGLE 89°58'13" A DISTANCE OF 66.93 FEET;

THENCE WEST WITH AN INTERIOR ANGLE 89°27'14" A DISTANCE OF 3.01';

THENCE SOUTH WITH AN EXTERIOR ANGLE 90°0'0" A DISTANCE 36.20 TO A POINT ON THE NORTH SIDE OF EAST 150th. STREET;

THENCE WEST ALONG SAID NORTH SIDE OF EAST 150th. STREET A DISTANCE OF 79.36 FEET TO THE POINT OF BEGINNING.

SAID EASEMENT CONTAINS 0.6918 ACRES

Track Descriptions

CONDITIONAL TRACK 1 AREA

BEGINNING NORTH 35.37 FEET FROM THE INTERSECTION FORMED BY THE NORTH SIDE OF EAST 150th. STREET WITH
THE EAST SIDE OF GERARD AVENUE;
THENCE NORTH ALONG THE EAST SIDE OF SAID GERARD AVENUE A DISTANCE OF 322.64 FEET;

THENCE EAST WITH AN INTERIOR ANGLE OF 90°00'00" A DISTANCE OF 92.56 FEET;
THENCE SOUTH WITH AN INTERIOR ANGLE OF 89°27'43" A DISTANCE OF 136.98 FEET;
THENCE WEST WITH AN INTERIOR ANGLE OF 90°03'19" A DISTANCE OF 1.55 FEET;
THENCE SOUTH WITH AN EXTERIOR ANGLE OF 90°03'22" A DISTANCE OF 26.94 FEET;
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THENCE EAST WITH AN EXTERIOR ANGLE OF 89°57'54" A DISTANCE OF 11.43 FEET;
THENCE SOUTH WITH AN INTERIOR ANGLE OF 89°58'13" A DISTANCE OF 63.15 FEET;
THENCE WEST WITH AN INTERIOR ANGLE OF 89°27'14" A DISTANCE OF 3.01';
THENCE WEST WITH AN INTERIOR ANGLE OF 89°57'10" 82.58 FEET TO THE POINT OF BEGINNING

SAID EASEMENT CONTAINS 0.6218 ACRES

TRACK 2 LEGAL DESCRIPTION
BEGINNING AT THE INTERSECTION FORMED BY THE NORTH SIDE OF EAST 150th. STREET WITH
THE EAST SIDE OF GERARD AVENUE;
THENCE NORTH ALONG THE EAST SIDE OF SAID GERARD AVENUE A DISTANCE OF 35.37 FEET;
THENCE EAST WITH AN INTERIOR ANGLE OF 89°57'39" A DISTANCE OF 82.58 FEET;
THENCE SOUTH WITH AN INTERIOR ANGLE OF 90°02'50" A DISTANCE OF 3.78 FEET;
THENCE WEST WITH AN INTERIOR ANGLE OF 89°27'14" A DISTANCE OF 3.01 FEET;
THENCE SOUTH WITH AN EXTERIOR ANGLE OF 90°00'00" A DISTANCE OF 36.20 FEET TO A POINT ON
SAID EAST 150TH STREET;
THENCE WEST ALONG SAID EAST 150TH STREET WITH AN INTERIOR ANGLE OF 87°11'42" A DISTANCE
OF 79.36 FEET TO THE POINT OF BEGINNING.

SAID EASEMENT CONTAINS 0.0700 ACRES

NEW YORK STATE DEPARTMENT ENVIRONMENTAL CONSERVATION
BROWNFIELD CLEANUP PROGRAM
ECL § 27-1401 *et seq.*

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580 Gerard Former Post Office Vehicle Repair Shop
DEC Site No.: C203142
Located at: 580 Gerard Avenue a/k/a 586 Gerard Avenue
Bronx, New York 10451

Volunteer: SB Gerard Avenue, LLC
40 West 57th Street, 29th Floor
New York, New York 10019

AFFIRMATION OF LINDA R. SHAW IN SUPPORT OF MAILING MUNICIPAL NOTICES

I, **LINDA R. SHAW**, an attorney admitted to practice in the State of New York, affirms under penalty of perjury the following:

1. Knauf Shaw LLP are the attorneys of record for SB Gerard Avenue, LLC, which is the Volunteer for the New York State Brownfield Cleanup Program Site ("BCP"), 580 Gerard Former Post Office Vehicle Repair Shop, Site Number C203142.
2. On August 6, 2024, I mailed a true copy of a Notice to Municipality with a copy of the Environmental Easement to Dan Garodnick, Chair, New York City Planning Commission, 120 Broadway, 31st Floor, New York, New York 10271, by depositing a true copy of the same enclosed in a first-class, postpaid addressed envelope in an official depository under the exclusive care and custody of the United States Postal Service within the State of New York.
3. On August 6, 2024, I mailed a true copy of a Notice to County with a copy of the Environmental Easement to Vanessa L. Gibson, President, Bronx Borough, 851 Grand Concourse, 3rd Floor, Bronx, New York 10451 by depositing a true copy of the same enclosed in a first-class, postpaid addressed envelope in an official depository under the exclusive care and custody of the United States Postal Service within the State of New York.

WHEREFORE, Linda Shaw respectfully requests that this affirmation is acceptable proof of mailing for the municipal notices required for the Brownfield Cleanup Program Site.

Dated: August 6, 2024

Linda R. Shaw

LINDA R. SHAW

Notice to County

08/06/2024

Vanessa L. Gibson
Bronx Borough President
851 Grand Concourse, 3rd Floor
Bronx, New York 10451

Re: Environmental Easement

Dear Ms. Gibson:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("Department") on May 20, 2024, by SB Gerard Avenue, LLC, for property at 580 Gerard Avenue a/k/a 586 Gerard Avenue, Bronx, New York 10451, Tax Map No. Bronx-2353-1, DEC Site No: C203142.

This Environmental Easement restricts future use of the above-referenced property to restricted residential, commercial and industrial uses. Any on-site activity must be done in accordance with the Environmental Easement and the Site Management Plan which is incorporated into the Environmental Easement. Department approval is also required prior to any groundwater use.

Article 71, Section 71-3607 of the New York State Environmental Conservation Law requires that:

> 1. Whenever the department is granted an environmental easement, it shall provide each affected local government with a copy of such easement and shall also provide a copy of any documents modifying or terminating such environmental easement.
>
> 2. Whenever an affected local government receives an application for a building permit or any other application affecting land use or development of land that is subject to an environmental easement and that may relate to or impact such easement, the affected local government shall notify the department and refer such application to the department. The department shall evaluate whether the application is consistent with the environmental easement and shall notify the affected local government of its determination in a timely fashion, considering the time frame for the local government's review of the application. The affected local government shall not approve the application until it receives approval from the department.

An electronic version of every environmental easement that has been accepted by the Department is available to the public at: http://www.dec.ny.gov/chemical/36045.html. Please forward this notice to your building and/or planning departments, as applicable, to ensure your compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,

SB Gerard Avenue, LLC

Notice to Municipality

08/06/2024

Dan Garodnick, Chair
New York City Planning Commission
120 Broadway, 31st Floor
New York, New York 10271

Re: Environmental Easement

Dear Mr. Garodnick:

Attached please find a copy of an environmental easement granted to the New York State Department of Environmental Conservation ("Department") on May 20, 2024, by SB Gerard Avenue, LLC, for property at 580 Gerard Avenue a/k/a 586 Gerard Avenue, Bronx, New York 10451, Tax Map No. Bronx-2353-1, DEC Site No: C203142.

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compliance with these provisions of New York State Environmental Conservation Law. If you have any questions or comments regarding this matter, please do not hesitate to contact me.

Very truly yours,

SB Gerard Avenue, LLC

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

ADDRESS:
580 GERARD AVENUE
A/K/A 586 GERARD AVENUE
BRONX, N.Y.

CONDITIONAL TRACK 1 AREA
BEGINNING NORTH 35.37 FEET FROM THE INTERSECTION FORMED BY THE NORTH SIDE OF EAST 150th. STREET WITH THE EAST SIDE OF GERARD AVENUE;
THENCE NORTH ALONG THE EAST SIDE OF SAID GERARD AVENUE A DISTANCE OF 322.64 FEET;
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THENCE SOUTH WITH AN INTERIOR ANGLE OF 89°58'13" A DISTANCE OF 63.15 FEET;
THENCE WEST WITH AN INTERIOR ANGLE OF 89°27'14" A DISTANCE OF 3.01';
THENCE WEST WITH AN INTERIOR ANGLE OF 89°57'10" 82.58 FEET TO THE POINT OF BEGINNING.

SAID EASEMENT CONTAINS 0.6218 ACRES

TRACK 2 LEGAL DESCRIPTION
BEGINNING AT THE INTERSECTION FORMED BY THE NORTH SIDE OF EAST 150th. STREET WITH THE EAST SIDE OF GERARD AVENUE;
THENCE NORTH ALONG THE EAST SIDE OF SAID GERARD AVENUE A DISTANCE OF 35.37 FEET;
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THENCE SOUTH WITH AN INTERIOR ANGLE OF 90°02'50" A DISTANCE OF 3.78 FEET;
THENCE WEST WITH AN INTERIOR ANGLE OF 89°27'14" A DISTANCE OF 3.01 FEET;
THENCE SOUTH WITH AN EXTERIOR ANGLE OF 90°00'00" A DISTANCE OF 36.20 FEET TO A POINT ON SAID EAST 150TH STREET;
THENCE WEST ALONG SAID EAST 150TH STREET WITH AN INTERIOR ANGLE OF 87°11'42" A DISTANCE OF 79.36 FEET TO THE POINT OF BEGINNING.

SAID EASEMENT CONTAINS 0.0700 ACRES

BCP SITE/ENVIRONMENTAL EASEMENT AREA LEGAL DESCRIPTION

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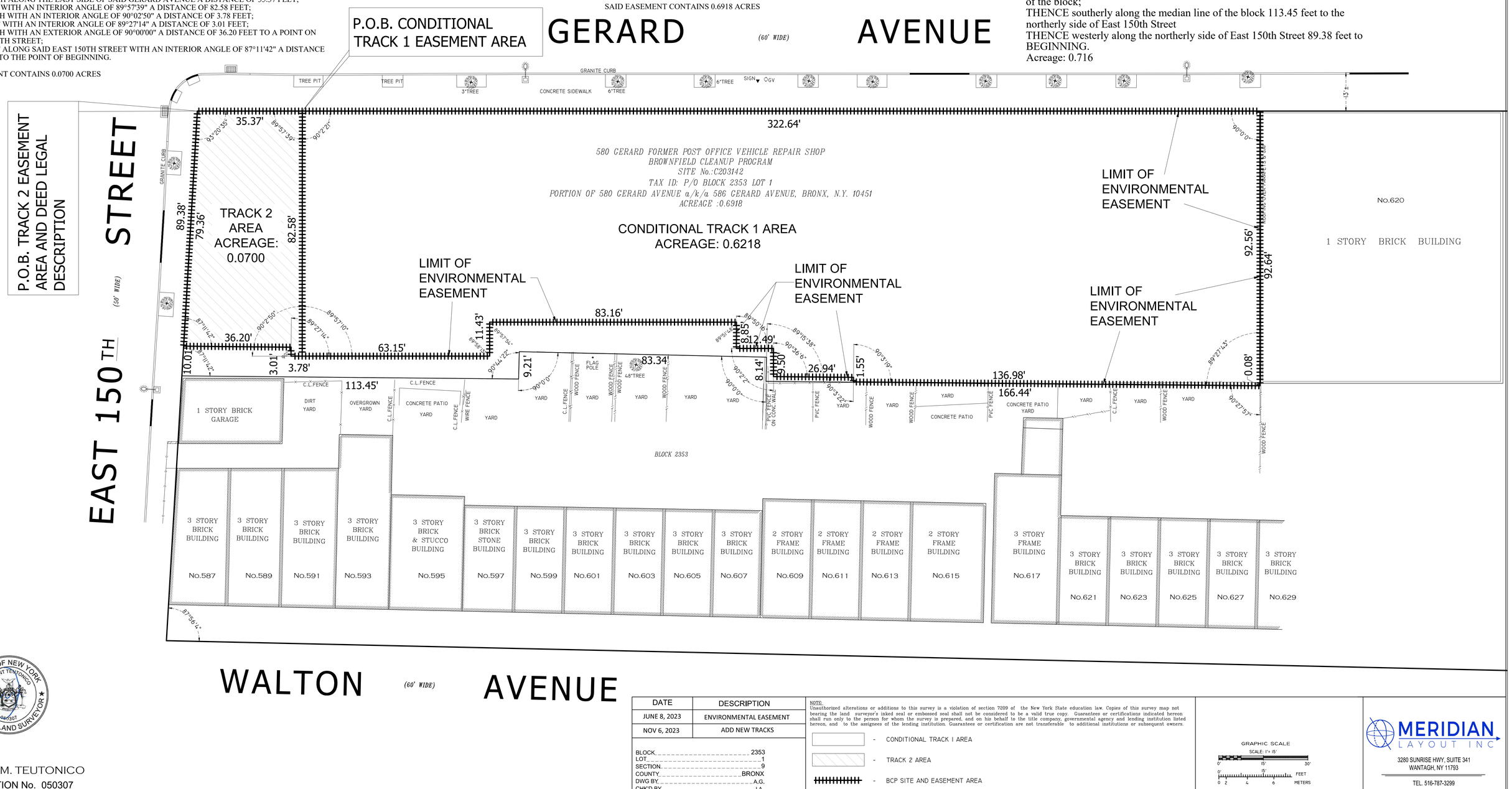
THENCE WEST ALONG SAID NORTH SIDE OF EAST 150th. STREET A DISTANCE OF 79.36 FEET TO THE POINT OF BEGINNING.

SAID EASEMENT CONTAINS 0.6918 ACRES

LEGAL DESCRIPTION - PER RECORDED DEED

All that certain plot, piece or parcel of land, situate, lying and being in the Borough of Bronx, county of Bronx, City and State of New York, bounded and described as follows:
All that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of Bronx, City and State of New York, bounded and described as follows:
BEGINNING at a point on the northerly side of East 150th Street and the easterly side of Gerard Avenue;
THENCE northerly along the easterly side of Gerard Avenue 358 feet;
THENCE easterly at right angles to Gerard Avenue 92.64 feet to the median line of the block between Gerard and Walton Avenue;
THENCE southerly along the median line of the block 166.44 feet;
THENCE westerly at right angles to Walton Avenue 8.14 feet;
THENCE southerly parallel with Walton Avenue 83.34 feet;
THENCE easterly at right angles to Walton Avenue 9.21 feet to the median line of the block;
THENCE southerly along the median line of the block 113.45 feet to the northerly side of East 150th Street
THENCE westerly along the northerly side of East 150th Street 89.38 feet to BEGINNING.
Acreage: 0.716



DATE	DESCRIPTION
JUNE 8, 2023	ENVIRONMENTAL EASEMENT
NOV 6, 2023	ADD NEW TRACKS

BLOCK 2353
LOT 1
SECTION 9
COUNTY BRONX
DWG BY A.G.
CHK'D BY J.A.

NOTE:
Unauthorized alterations or additions to this survey is a violation of section 7209 of the New York State education law. Copies of this survey map not bearing the land surveyor's inked seal or embossed seal shall not be considered to be a valid true copy. Guarantees or certifications indicated hereon shall run only to the person for whom the survey is prepared, and on his behalf to the title company, governmental agency and lending institution listed hereon, and to the assignees of the lending institution. Guarantees or certification are not transferable to additional institutions or subsequent owners.

- CONDITIONAL TRACK I AREA
- TRACK 2 AREA
- BCP SITE AND EASEMENT AREA

GRAPHIC SCALE
SCALE: 1" = 15'
0' 15' 30'
0 5 FEET
0 2 4 6 METERS

MERIDIAN LAYOUT INC
3280 SUNRISE HWY, SUITE 341
WANTAGH, NY 11793
TEL. 516-787-3299

STATE OF NEW YORK
VINCENT TENTONICO
050307
LICENSED LAND SURVEYOR

VINCENT M. TEUTONICO
REGISTRATION No. 050307

APPENDIX B

List of Site Contacts

Name	Phone/Email Address
Site Owner/Remedial Party: SB Gerard Avenue LLC c/o Sharone Karten, The Karten Organization c/o Hugo Diaz, Stellar Management	Phone: (917) 596-0821 Email: sharonekarten@gmail.com Phone: (929) 626-0891 Email: hdiaz@stellarmanagement.com
Paul Martorano, P.E., Roux, Environmental Consultant and Remedial Engineer	Phone: (631) 232-2600 Email: pmartorano@rouxinc.com
Robert Kovacs, P.G., Roux, Environmental Consultant and Qualified Environmental Professional	Phone: (631) 232-2600 Email: rkovacs@rouxinc.com
Steven Wu, NYSDEC Region 2 Project Manager	Phone: (718) 482-6725 Email: steven.wu@dec.ny.gov
Andre Obligado, P.G., NYSDEC Project Manager's Supervisor	Phone: (718) 482-6412 Email: andre.obligado@dec.ny.gov
Kelly Lewandowski, NYSDEC Site Control Section	Phone: (518) 402-9569 Email: kelly.lewandowski@dec.ny.gov
Mark Sergott, NYSDOH Project Manager	Phone: (518) 402-7860 Email: mark.sergott@health.ny.gov
Linda Shaw, Knauf Shaw LLP, Remedial Party Attorney	Phone: (585) 546-8430 Email: lshaw@nyenvlaw.com

APPENDIX C

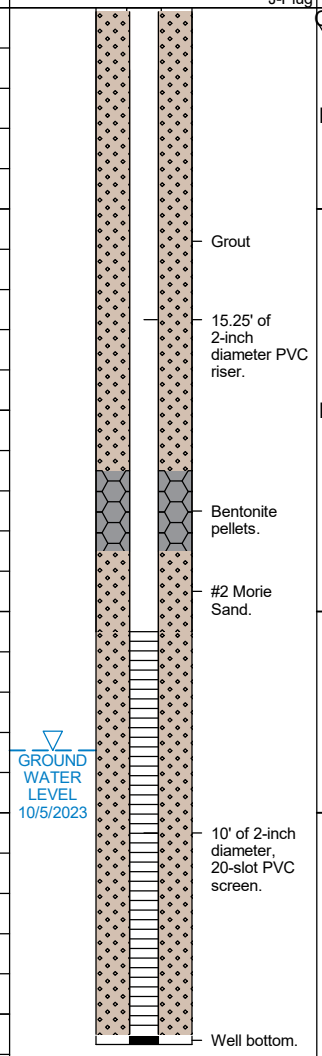
Soil Boring and Monitoring Well Construction Logs

RXMW-07

Client:	Site:	Project Number:
SB Gerard Avenue LLC	580 Gerard Former Post Office	3523.0001Y000
Address:	**City/State:**	**Logged By:**
580-610 Gerard Avenue	The Bronx, New York	E. Lovekamp

Start to Finish Date:	Contractor:	Drill Type:	Sampler Type/Method:
10/3/2023 - 10/6/2023	Earth Construction Services	Geoprobe	Cuttings
Borehole Depth:	**Backfill:**	**Borehole Diameter:**	**DTW:**
30 feet	#1 Sand/Grout	7-inches	18.45 feet
Area:	**Elevation:**	**Latitude:**	**Longitude:**
The Bronx, New York	NM	NM	NM

Well Depth:	Well Dia./Materials:	Screen Interval:	Screen Slot Size:	Sand/Filter Pack Size:	Annular Seal:
25.75 feet	2-inch PVC	17.5-27.5 feet	20-Slot	Morie #1	Bentonite



Depth (ft)	USCS	USCS Graphic	Visual Description	Sample Interval	Recovery (ft)	PID	Notes
0	CONC		CONCRETE				
	MIXD		Brown, fine to medium SAND, little Silt and fine Gravel, trace concrete and brick (FILL); moist		5		
5	MIXD		Brown, fine to medium SAND, little Silt and fine Gravel, trace brick (FILL); moist		5		
10	MIXD				5		
15	SM		Brown, fine SAND, some Silt, trace fine gravel; moist		5		
20	SM		Brown, fine SAND and SILT, trace fine gravel; wet		5		Odor observed from 20-30' below land surface
25					5		
30			Bottom of borehole at 30 feet				

RXMW-08

Client:	Site:	Project Number:
SB Gerard Avenue LLC	580 Gerard Former Post Office	3523.0001Y000
Address:	**City/State:**	**Logged By:**
580-610 Gerard Avenue	The Bronx, New York	E. Lovekamp

Start to Finish Date:	Contractor:	Drill Type:	Sampler Type/Method:
10/3/2023 - 10/6/2023	Earth Construction Services	Geoprobe	Cuttings
Borehole Depth:	**Backfill:**	**Borehole Diameter:**	**DTW:**
30 feet	#1 Sand/Grout	7-inches	20.16 feet
Area:	**Elevation:**	**Latitude:**	**Longitude:**
The Bronx, New York	NM	NM	NM

Well Depth:	Well Dia./Materials:	Screen Interval:	Screen Slot Size:	Sand/Filter Pack Size:	Annular Seal:
27.75 feet	2-inch PVC	15.5-25.5 feet	20-Slot	Morie #1	Bentonite

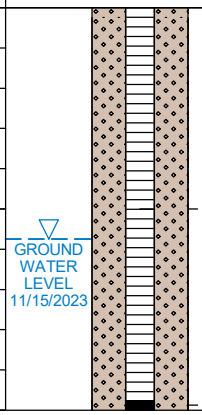
Depth (ft)	Well Diagram	USCS	USCS Graphic	Visual Description	Sample Interval	Recovery (ft)	PID	Notes
0	J-Plug	CONC		CONCRETE				
		MIXD		Dark Brown, fine to medium SAND, little fine to coarse Gravel and Cobble, trace silt and brick (FILL); moist		5		
5	Grout					5		
10	15.25' of 2-inch diameter PVC riser.	SM		Brown, fine to medium SAND, little fine to coarse Gravel and Silt, trace brick (FILL); moist		5		
15	Bentonite pellets.	SM		Brown, fine SAND, some Silt, trace fine gravel; moist		5		
20	#2 Morie Sand. GROUND WATER LEVEL 10/5/2023	SM		Brown, fine SAND, some Silt, trace fine gravel; wet		5		Odor observed from 20-30' below land surface
25	10' of 2-inch diameter, 20-slot PVC screen.	SM		Dark Brown, fine SAND and SILT, trace fine gravel; wet		5		
30	Well bottom.			Bottom of borehole at 30 feet				

RXMW-09

Client:	Site:	Project Number:
SB Gerard Avenue LLC	580 Gerard Former Post Office	3523.0001Y000
Address:	**City/State:**	**Logged By:**
580-610 Gerard Avenue	The Bronx, New York	P. Perry

Start to Finish Date:	Contractor:	Drill Type:	Sampler Type/Method:
11/15/2023 - 11/15/2023		Hand Auger	Cuttings
Borehole Depth:	**Backfill:**	**Borehole Diameter:**	**DTW:**
10 feet	#1 Sand/Grout	5-inches	5.75 feet
Area:	**Elevation:**	**Latitude:**	**Longitude:**
The Bronx, New York	NM	NM	NM

Well Depth:	Well Dia./Materials:	Screen Interval:	Screen Slot Size:	Sand/Filter Pack Size:	Annular Seal:
10 feet	1-inch PVC	0-10 feet	20-Slot	Morie #1	

Depth (ft)	Well Diagram	USCS	USCS Graphic	Visual Description	Sample Interval	Recovery (ft)	PID	Notes
5								
10								

APPENDIX D

Excavation Work Plan

APPENDIX D – EXCAVATION WORK PLAN (EWP)

D-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. Table D includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table D-1: Notifications*

Name	Contact Information
Steven Wu Project Manager, NYSDEC Division of Environmental Remediation, Superfund and Brownfield Cleanup Section	(718) 482-6725 steven.wu@dec.ny.gov
Jane O'Connell Regional Remedial Engineer, NYSDEC Division of Environmental Remediation, Superfund and Brownfield Cleanup Section	(718) 482-4599 jane.oconnell@dec.ny.gov
Kelly Lewandowski Chief, NYSDEC Division of Environmental Remediation, Site Control Section	(518) 402-9569 kelly.lewandowski@dec.ny.gov
Mark Sergott Project Manager, NYSDOH Bureau of Environmental Exposure Investigation	(518) 402-7860 mark.sergott@health.ny.gov

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

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;

- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

D-2 SOIL SCREENING METHODS

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

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections D-6 and D-7 of this Appendix.

D-3 SOIL STAGING METHODS

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

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

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

D-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

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

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

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

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

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

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

D-5 MATERIALS TRANSPORT OFF-SITE

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

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

The proposed inbound truck route to the Site is:

- From I-87 S, take Exit 5 for Macombs Dam Br and merge onto Major Deegan Service Road;
- Take Major Deegan Service Road south for approximately 1 mile and turn south onto Exterior Street (left turn);
- Take Exterior Street south for approximately 0.4 miles and turn east onto E 149th Street (left turn);
- Take E 149th Street east for approximately 360 feet and turn north onto Gerard Avenue (left turn);
- Take Gerard Avenue north for approximately 0.1 miles and the Site is located on the right.

The proposed outbound truck route from the Site is:

- Exit the site onto Gerard Avenue (right turn);
- Take Gerard Avenue north for approximately 0.2 miles and turn northwest onto E 153rd Street (left turn);
- Take E 153rd Street northwest for approximately 0.3 miles and turn west onto E 157th street (slight left turn);
- Take S 157th Street west for approximately 260 feet and turn north onto Major Deegan Service Road (right turn); and
- Take Major Deegan Service Road north for approximately 0.2 miles and stay left to merge onto I-87 N.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

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

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

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

D-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the Track 2 portion of the Site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

D-7 MATERIALS REUSE ON-SITE

The qualified environmental professional as defined in 6 NYCRR part 375 will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e., contaminated) does not remain on-site.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10

Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances April 2023 guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

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

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

D-8 FLUIDS MANAGEMENT

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

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

D-9 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt

at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

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

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d) and DER-10 Appendix 5 for unrestricted use in the conditional Track 1 portion of the Site and for restricted residential use in the Track 2 portion. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 7. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

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

D-10 STORMWATER POLLUTION PREVENTION

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

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

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

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

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

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

D-11 EXCAVATION CONTINGENCY PLAN

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

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

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

D-12 COMMUNITY AIR MONITORING PLAN

Air monitoring around the Site perimeter and within the community is described in the Community Air Monitoring Plan (CAMP) included in HASP located in Appendix E of the SMP. The location of air sampling stations will be based on generally prevailing wind conditions.

All CAMP reports will be submitted to NYSDEC and NYSDOH Project Managers on a daily basis. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers as soon as possible. All data is to be reported in the final report for the excavation activity.

D-13 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site. Specific odor control methods to be used on a routine basis will include limiting open excavation areas and covering excavated soil (i.e., with polyethylene sheeting or in covered roll off containers). If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events within one day of the odor event and notified of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Excavation Activities Report.

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

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

D-14 DUST CONTROL PLAN

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

- Use of properly anchored tarps to cover stockpiles;
- Exercising extra care during dry and high-wind periods; and

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

D-15 OTHER NUISANCES

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

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

D-16 REPORTING

A report is to be submitted to the NYSDEC within 90 days of completion of the activities performed under this EWP. This report shall contain a summary of the activities performed; a summary of all data gathered and results; information about any media that was removed from the site: volume, contamination levels, area from which removed; and any other information that may be indicate a change to the "remaining contamination" that is at the site. Such changes may require revision of the SMP.

APPENDIX E

Health and Safety Plan (including CAMP)

Site-Specific Health and Safety Plan

580 Gerard Former Post Office
Vehicle Repair Shop Site
580-610 Gerard Avenue
Bronx, New York
NYSDEC BCP Site No. C203142

August 8, 2024

Prepared for:

SB Gerard Avenue LLC
40 West 39th Street, 5th Floor
New York, New York 10018

Prepared by:

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

3523.0001Y131/CV

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Site-Specific Emergency Information

Emergency Phone Numbers

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

Emergency Contact Information			
Site Personnel			
Title	Contact		Telephone
Operations Manager (OM)	Jeff Wills		Main: (631) 232-2600 Direct: (631) 630-2366 Mobile: (516) 637-0213
Project Principal (PP)	Robert Kovacs		Main: (631) 232-2600 Direct: (631) 630-2320 Mobile: (516) 250-0359
Project Manager (PM)	Jessica Lam		Main: (631) 232-2600 Direct: (631) 630-2349 Mobile: (516) 270-4095
Site Supervisor (SS)	TBD		TBD
Site Health and Site Safety Officer (SHSO)	TBD		TBD
Office Health and Safety Manager (OHSM)	Nevin Pahlad		Main: (631) 232-2600 Direct: (631) 630-2426 Mobile: (347) 885-6930
Corporate Health and Safety Manager (CHSM)	Brian Hobbs		Main: (631) 232-2600 Direct: (631) 630-2419 Mobile: (631)807-0193
AllOne Health	Occupational Health Care Management Provider		800-350-4511
Client Emergency Contact	Steve Wilkowski		Mobile: (718) 326-2808
Outside Assistance			
Agency	Contact	Telephone	Address/Location
Ambulance/emergency medical services (EMS)	FDNY EMS Station 14	(718) 665-1832 / 911	2824 Park Avenue, Bronx, New York
Police	Lincoln Hospital Police Station	(718) 579-5757/ 911	234 East 149th Street, Bronx, New York
Fire	FDNY Squad 41	(347) 272-5083 / 911	330 East 150th Street, Bronx, New York
Site Address	580-610 Gerard Avenue, Bronx, NY 10451		

Directions to Lincoln Medical Center, 34 E 149th Street, Bronx, NY 10451 (Figure 3):

1. Head north on Gerard Avenue towards East 151st Street.
2. Turn right onto East 151st Street.
3. Turn right at the 1st cross street onto Walton Avenue.
4. Turn left onto East 149th Street and the destination will be ahead on the right.

Directions to AFC Urgent Care Bronx 149th, 332 E 149th Street, Bronx, NY 10451 (Figure 3):

1. Head north on Gerard Avenue towards East 151st Street.
2. Turn right onto East 151st Street.
3. Turn right at the 1st cross street onto Walton Avenue.
4. Turn left onto East 149th Street and the destination will be ahead 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 during the Remedial Action (RA) (e.g., soil excavation/management, endpoint/backfill sampling, construction oversight, vapor barrier installation, etc.) at the 580 Gerard Former Post Office Vehicle Repair Site located at 580-610 Gerard Avenue, Bronx, New York (Site) (see **Figure 1**). These activities fall within the scope of operations covered by the Occupational Safety and Health Administration (OSHA) standards promulgated at 29 CFR 1910.120 and 29 CFR 1926.65, both commonly referred to as the Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard. In accordance with the HAZWOPER Standard, this Site-specific HASP was prepared to address the safety and health hazards associated with the RA 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 on-Site 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 for this project is Jessica Lam. The Site Supervisor (SS) and Site Health and Safety Officer (SHSO) is to be decided and will be communicated prior to the start of any work.

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, officials, and Site contractors.

Site Health and Safety Officer (SHSO)

The SHSO has full responsibility and authority to develop and implement this HASP and to verify compliance. The SHSO reports to the Project Manager. The SHSO is on Site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SHSO include:

- Managing the safety and health functions on this Site;

- Serving as the Site's point of contact for safety and health matters;
- Ensuring Site monitoring, worker training, and effective selection and use of PPE;
- Assessing Site conditions for unsafe acts and conditions and providing corrective action;
- Assisting the preparation and review of this hasp;
- Maintaining effective safety and health records as described in this HASP; 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.

Site Workers

Site workers are responsible for complying with this HASP, using the proper PPE, reporting unsafe acts and conditions, and following the work and safety and health instructions of the Project Manager (PM), SHSO, and Site Supervisor.

2. Background

The Site is located in the Concourse Village section of the Bronx, New York as shown on **Figure 1**. The Site is approximately 31,200-square feet in size.

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

2.1 Site Description

The Site is approximately 32,200-square feet in area and is developed with a one-story garage building with offices and a partial basement used for utilities. The building is currently vacant but was most recently occupied by a US Postal Service branch.

Adjacent properties include a one-story warehouse and garage building to the north; a one-story warehouse and garage building to the south; residential apartment buildings to the east; and a two-story commercial building and parking lot to the west.

2.2 Site History

Sanborn maps indicated that the Site was first developed in 1951 with the current building located at the Site, which was identified as a post office garage. The maps further indicate that this structure was built in 1950. The Sanborn Maps generally indicate the presence of this garage until the most recent 2007 map. No developments prior to 1950 were identified in any of the Sanborn Maps reviewed.

2.3 Known and Potential Releases of Hazardous Substances at the Site

GEI performed a Phase II ESA of the Site in September 2018 which included the performance of a Ground Penetrating Radar (GPR) survey, advancement of eight soil borings, collection of sixteen soil samples, advancement of two groundwater probes, collection of two groundwater samples and the collection of four sub-slab soil vapor samples.

The results of the soil subsurface investigation identified exceedances of Restricted Residential Soil Cleanup Objectives (RRSCOs) for metals in six (6) of eight (8) borings; semi volatile organic compounds (SVOCs) in four (4) borings; and polychlorinated biphenyls (PCBs) in two (2) borings. Metals and Total PCBs were detected at the highest concentrations in SB-3 at a depth of 0-2 feet bls. SVOCs were detected above RRSCOS in four borings, with the highest concentrations revealed in SB-7 at a depth of 0-2 feet bls. Pesticides were also detected at concentrations above Unrestricted Use Soil Cleanup Objectives (UUSCOs); however, they were below RRSCOs in four (4) borings, with the highest concentration detected in SB-8 at a depth of 0-2 feet bls. VOCs were detected in groundwater sample SB-2(GW) including 1,2,4-Trimethlybenzene, 1,3,5-Trimethlybenzene, Chloroform, Isopropylbenzene, n-Butylbenzene, n-Propylbenzene, and Napthalene at concentrations above NYSDEC Technical and Operational Guidance Series (TOGs) standards.

No detections above NYSDEC TOGs standards were detected in groundwater sample SB-5 (GW). VOCs were detected in soil vapor at mostly low levels throughout the project Site, with the exception of elevated tetrachloroethene (PCE) detected in sub-slab soil vapor sample SV-2.

The Phase II ESA indicates that historical operations at the Site do not appear to have impacted environmental quality. However, based upon the historical use of the Site as an auto repair facility and the detection of metals, SVOCs, and PCBs in soil; VOCs in groundwater; and PCE in sub-slab soil vapor, there is potential for an on-Site source of contamination.

3. Scope of Work

Scope of work involves the following activities, along with the oversight and support of these activities by Roux, associated with the Site Management Plan.

3.1 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater monitoring wells on a quarterly basis. Sample locations, required analytical parameters, and schedule are provided in the Post Remediation Sampling Requirements and Schedule below. Modifications to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Post-Remediation Sampling Requirements and Schedule

Sample Location	Analytical Parameter	Schedule
Monitoring Wells (RXMW-07 and RXMW-08)	VOCs (EPA Method 8260D)	Quarterly for 4 rounds

Detailed sample collection and analytical procedures and protocols are provided in Appendix F – Field Sampling Plan/Quality Assurance Project Plan. There are no other media to be monitored or sampled following completion of the remedial action.

3.1.1 Groundwater Sampling

Groundwater monitoring will be performed as part of this SMP. Post-remediation sampling will occur quarterly for a total of 4 rounds to assess the performance of the remedy. Following the fourth sampling round, a Groundwater Monitoring Plan Summary Report will be prepared and submitted to the NYSDEC outlining the sampling results and proposed course of action. Modifications to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Two off-Site monitoring wells have been installed to monitor groundwater conditions downgradient of the treated hotspot area (Conditional Track 1 area). These off-Site wells have been designed to monitor the overall performance of the remedial action. The groundwater monitoring wells were installed in accordance with the approved Groundwater Remediation and Soil Vapor Sampling Work Plan dated February 6, 2023.

As part of the groundwater monitoring, the remedial party will measure depth to the water of each monitoring well before and during sampling.

The monitoring wells are constructed of 2-inch PVC with 10 feet of 0.020-inch slot screens, set approximately five feet below the water table and five feet above the water table at each location. The annular space surrounding the well screens were backfilled with sand and a two-foot grout seal with a flush-mounted steel well cover at grade. Wells RXMW-07 and RXMW-08 are located within the sidewalk northwest of the Site.

Monitoring well construction logs are included in Appendix C of this SMP. The groundwater monitoring well locations are shown on Figure 4 of this SMP.

If biofouling or silt accumulation occurs in the off-Site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable. Repairs and/or replacement of wells will be performed based on assessments of structural integrity and overall performance.

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 will be authorized only at designated points to be determined.

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: cellular telephones and visual hand signals.

- Cellular telephones will be available for communication with emergency support services/facilities. Each field person is equipped with a cellular telephone and is available for communication with emergency support services. A current list of emergency contact numbers is published and posted 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

Hand Signals

SIGNAL	MEANING
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 presence or absence of biological and chemical 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. The Heavy Equipment Exclusion Zone Policy is attached in **Appendix F**.

Exclusion Zone

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

- A buddy (co-worker);
- Required minimum level PPE;
- Medical Authorization;
- Training certification; 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. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

5. Job Hazard Evaluation

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

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

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

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

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

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

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

The foregoing is intended to provide Roux employees with a general awareness of the hazards involved with Site work. A more detailed review of the potential hazards associated with each specific activity planned for the Site (or 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 on-Site. 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 as **Appendix G**.

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.

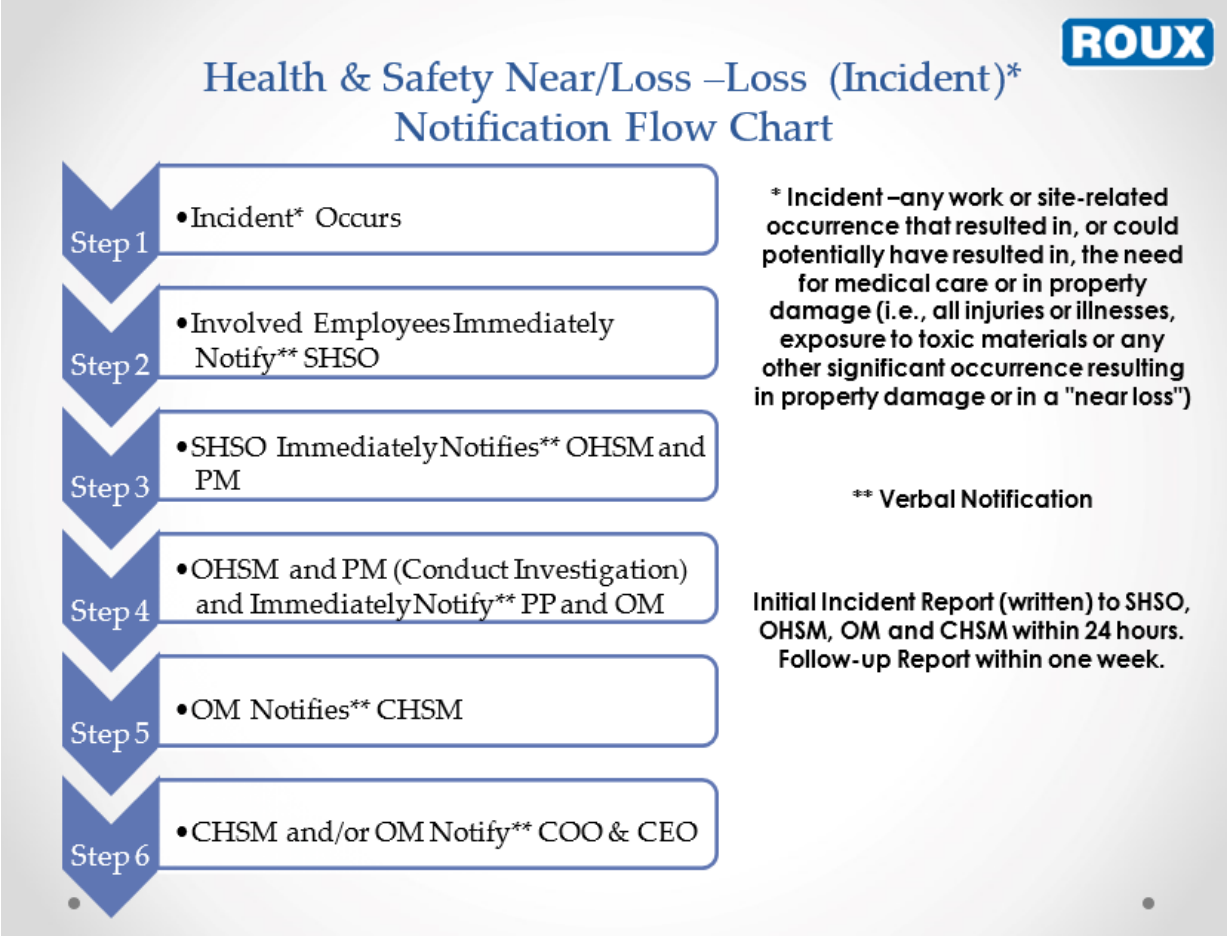
    1. Based on discussions with the Project Team, Corporate Management and the AOH evaluation, if medical attention beyond on-Site First Aid is warranted, transport the injured / ill person (IP) to the Urgent Care Center, or notify the Fire Department or Ambulance Emergency service and

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 Lincoln Medical Center and AFC Urgent Care Bronx is included as **Figure 3**.

b. Decontaminate to the extent possible prior to administration of first aid or movement to medical or emergency facilities.

c. First aid medical support will be provided by on-Site 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).

d. 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 on-Site, all on-Site activities shall stop and personnel shall seek proper shelter (e.g., substantial building, enclosed vehicle, etc.). Work shall not resume until the threat of lighting 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 on-Site 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 entirely.

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 on-Site 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 Photoionization Detector (PID) with a lamp energy of 10.6 eV will be used to provide direct readings of organic vapor concentrations during intrusive activities to determine that personnel protection is adequate. Concentrations shall be recorded during intrusive activities with the potential to encounter contaminant vapors.

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)[1]	**Action**
0-1 ppm above background[2]	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[3].
≥ 25 ppm	Ventilate space and evacuate area.

1 Based on relative response/sensitivity of PID to benzene.
2 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.
3 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_2 Reading in Breathing Zone (%)[1]	**Action**
20.9% O_2	Oxygen level normal
< 19.5% O_2	Oxygen deficient Interrupt task/Evacuate area
>23.5% O_2	Oxygen enriched Interrupt task/Evacuate area

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

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

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

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

Air Monitoring Summary and Action Levels Hydrogen Sulfide	
Hydrogen Sulfide (H_2S) 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_2S because of olfactory fatigue	

7.6.2 Air Monitoring Equipment and Calibration

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

If air monitoring data indicate safe levels of potentially harmful constituents at consistent intervals (5-minute intervals), then monitoring can be conducted less frequently (every 30 minutes). This determination will be made by the on-Site 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 Jessica Lam. 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

Jessica Lam, Project Geologist, 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

Confined space entry is not anticipated during the 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 and 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**.

7.13.2.1 Excavations and Trenching

All trenching and excavation work activities contracted by Roux shall comply with 29 CFR 1926.651-652 Subpart P. Additionally, for trenches greater than 4 feet deep, where employees will enter, the trench needs to have a stairway or ladder or other safe means of egress. Where employees will enter trenches greater than 5 feet deep, the trench must have some type of protective system or sloped appropriately to prevent cave-ins.

The SHSO will be present on-Site during all Roux contracted excavation and backfill operations and will supplement health and safety monitoring conducted by Subcontractor air quality screening to ensure that appropriate levels of protection and safety procedures are utilized. The proximity of chemical, water, sewer, and electrical lines will be identified by Roux and/or their subcontractor before any subsurface activity or sampling is attempted.

The following safe work practices will be implemented during this task.

- The proximity of chemical, water, sewer, and electrical lines will be identified by a facility representative prior to beginning any subsurface activity.
- While earthmoving, stay out of the excavator's delineated heavy equipment exclusion zone and away from the excavation sides, where there is potential for cave in (within excavations that are 6 feet or more in depth, a delineated perimeter 6 feet away from the excavated edge is required).

Maximum Allowable Slopes

Soil or Rock Type	Maximum Allowable Slopes (H:V)[1] for Excavations Less Than 20 Feet Deep[3]
Stable Rock	Vertical (90°)
Type A[2]	3/4 : 1 (53°)
Type B	1 : 1 (45°)

Maximum Allowable Slopes

Soil or Rock Type	Maximum Allowable Slopes (H:V)[1] for Excavations Less Than 20 Feet Deep[3]
Type C	1 1/2 : 1 (34°)

OSHA (29 CFR 1926.652, Subpart P, Appendices A and B)

Notes:

1 Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

2 A short-term maximum allowable slope of 1/2H : 1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 meters) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 meters) in depth shall be 3/4H : 1V (53°).

3 Sloping or benching for excavations greater than 20 feet deep shall be designed and stamped by a registered professional engineer.

Proper stockpiling (i.e., 2 feet minimum distance from the excavation edge), containment, transport, storage, and disposal practices will be utilized and is dependent upon the potential type and amount of waste generated during operations. The location of safety equipment and evacuation procedures will be established prior to initiation of operations according to this HASP.

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 27 and 85 degrees Fahrenheit during the year in Bronx, NY.

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.

8. Field Team Review

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

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

Site/Project: 580 Gerard Former Post Office Vehicle Repair Site
580-610 Gerard Avenue, Bronx, New York

Name Printed	Signature	Date

9. Approvals

By their signature, the undersigned certify that this HASP is approved and will be utilized at the 580 Gerard Former Post Office Vehicle Repair Site.

TBD – Site Health and Safety Officer	Date
Nevin Pahlad – Office Health and Safety Manager	Date
Jessica Lam – Project Manager	Date
Robert Kovacs – Project Principal	Date

TABLE

Toxicological Properties of Hazardous Substances Present at the Site

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
ORGANOCHLORINE PESTICIDES (OCP)									
DDT	50-29-3	TWA 1 mg/m3	TWA 0.5 mg/m3	TWA 1 mg/m3	500 mg/m3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eyes, skin, central nervous system, kidneys, liver, peripheral nervous system	White, odorless and tasteless, very stable, water-insoluble, synthetic BP: 260°F Fl.Pt. = 162-171°F LEL: NA UEL: NA
Aldrin	309-00-2	TWA 0.1 mg/m3	TWA 0.25 mg/m3	TWA 0.25 mg/m3	25 mg/m3	Inhalation, ingestion, skin and/or eye contact	headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; clonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen]	Developmemntal, Endocrine, Liver, Immune System, Nervous System,	Colorless to dark-brown crystalline solid with a mild chemical odor. BP: 293°F Fl.Pt. = 150°F LEL: NA UEL: NA
Lindane (gamma-BHC)	58-89-9	TWA 0.5 mg/m3	TWA 0.5 mg/m3	TWA 0.5 mg/m3	50 mg/m3	Inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose, throat; headache; nausea; clonic convulsions; resp difficulty; cyanosis; aplastic anemia; muscle spasm; In Animals: liver, kidney damage	Eyes, skin, respiratory system, central nervous system, blood, liver, kidneys	White to yellow, crystalline powder with a slight, musty odor. BP: 614°F Fl.Pt. = 150°F LEL: NA UEL: NA
Dieldrin	860-57-1□	TWA 0.1 mg/m3	TWA 0.25 mg/m3	TWA 0.25 mg/m3	25 mg/m3	Inhalation, ingestion, skin and/or eye contact	headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions; coma; ; In Animals: liver, kidney damage [potential occupational carcinogen]	Developmemntal, Endocrine, Liver, Immune System, Nervous System,	Colorless to light-tan crystals with a mild, chemical odor. BP: NA (Decomposes) Fl.Pt. = NA LEL: NA UEL: NA
VOLATILE ORGANIC COMPOUNDS (VOCs)									
1,1,1-Trichloroethane	71-55-6	TWA 350 ppm STEL 450 ppm	C 350 ppm (1900 mg/m^3) [15-minute]	TWA 350 ppm (1900 mg/m^3)	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 Fl.Pt. = NA LEL: 7.5% UEL: 12.5% Combustible Liquid, but burns with difficulty
1,1,2,2-Tetrachloroethane	79-34-5	TWA 1 ppm [skin]	Ca TWA 1 ppm (7 mg/m^3) [skin]	TWA 5 ppm (35 mg/m^3) [skin]	Ca [100 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Nausea, vomiting, abdominal pain; tremor fingers; jaundice, hepatitis, liver tenderness; dermatitis; leukocytosis (increased blood leukocytes); kidney damage; [potential occupational carcinogen]	Skin, liver, kidneys, central nervous system, gastrointestinal tract	Colorless to pale-yellow liquid with a pungent, chloroform-like odor BP: 296°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Liquid
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	TWA 1000 ppm STEL 1250 ppm	TWA 1000 ppm (7600 mg/m3) ST 1250 ppm (9500 mg/m3)	TWA 1000 ppm (7600 mg/m3)	2000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation skin, throat, drowsiness, dermatitis; central nervous system depression; In Animals: cardiac arrhythmias, narcosis	Skin, heart, central nervous system, cardiovascular system	Colorless to water-white liquid with an odor like carbon tetrachloride at high concentrations. [Note: A gas above 118°F.] BP: 118°F Fl.Pt. = NA LEL: NA UEL: NA
1,1,2-Trichloroethane	79-00-5	TWA 10 ppm [skin]	Ca TWA 10 ppm (45 mg/m3) [skin]	TWA 10 ppm (45 mg/m3) [skin]	Ca [100 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]	Eyes, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, chloroform-like odor BP: 237°F Fl.Pt. = NA LEL: 6% UEL: 15.5% Combustible Liquid, forms dense soot
1,1-Dichloroethane	75-34-3	TWA 100 ppm	TWA 100 ppm (400 mg/m^3)	TWA 100 ppm (400 mg/m^3)	3,000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation skin; central nervous system depression; liver, kidney, lung damage	Skin, liver, kidneys, lungs, central nervous system	Colorless, oily liquid with a chloroform-like odor. BP: 135°F Fl.Pt. = 2°F LEL: 5.4% UEL: 11.4% Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F.

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,1-Dichloroethene	75-35-4	TWA 5 ppm	Ca	None	Ca	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor BP: 89°F Fl.Pt. = -2°F LEL: 6.5% UEL: 15.5% Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F
1,2,3-Trichlorobenzene	87-61-6	Cameo Chemicals Source https://cameochemicals.noaa.gov/chemical/10051	NA	NA	NA	Inhalation, skin absorption, ingestion, skin and/or eye contact	Inhalation may cause irritation of respiratory tract. Irritating to the eyes. May redden skin on contact. Ingestion may cause liver damage.	Skin, eyes, respiratory tract, liver	A white solid with a sharp chlorobenzene odor. Insoluble in water and denser than water. Hence sinks in water Fl.Pt. = 234.9°F
1,2,4-Trichlorobenzene	120-82-1	C 5 ppm	C 5 ppm (40 mg/m3)	None	N.D.	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin, mucous membrane; In Animals: liver, kidney damage; possible teratogenic effects	Eyes, skin, respiratory system, liver, reproductive system	Colorless liquid or crystalline solid (below 63°F) with an aromatic odor BP: 416°F Fl.Pt. = 222°F LEL (302°F): 2.5% UEL (302°F): 6.6% Class IIIB Combustible Liquid: Fl.P. at or above 200°F. Combustible Solid
1,2-Dibromo-3-chloropropane	96-12-8	NA	Ca	TWA 0.001 ppm	Ca	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; drowsiness; nausea, vomiting; pulmonary edema; liver, kidney injury; sterility; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys, spleen, reproductive system, digestive system	Dense yellow or amber liquid with a pungent odor at high concentrations. [pesticide] [Note: A solid below 43°F.] BP: 384°F Fl.Pt. = (oc) 170°F LEL: NA UEL: NA Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.
1,2-Dibromoethane	106-93-4	None listed Skin	Ca TWA 0.045 ppm C 0.13 ppm [15-minute]	TWA 20 ppm C 30 ppm 50 ppm [5-minute maximum peak]	Ca [100 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system; dermatitis with vesiculation; liver, heart, spleen, kidney damage; reproductive effects; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, reproductive system	Colorless liquid or solid (below 50°F) with a sweet odor. [fumigant] BP: 268°F Fl.Pt. = 50°F LEL: NA UEL: NA Noncombustible Liquid
1,2-Dichlorobenzene	95-50-1	TWA 25 ppm STEL 50 ppm	C 50 ppm (300 mg/m3)	C 50 ppm (300 mg/m3)	200 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide] BP: 357°F Fl.Pt. = 1°F LEL: 2.2% UEL: 9.2% Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.
1,2-Dichloroethane	107-06-2	TWA 10 ppm	Ca TWA 1 ppm (4 mg/m3) ST 2 ppm (8 mg/m3)	TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	Ca [50 ppm]	Inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] BP: 182°F Fl.Pt. = 56°F LEL: 6.2% UEL: 16% Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F.
1,2-Dichloropropane	78-87-5	TWA 10 ppm Dermal Sensitizer (DSEN)	Ca	TWA 75 ppm (350 mg/m3)	Ca [400 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; In Animals: central nervous system depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless liquid with a chloroform-like odor. [pesticide] BP: 206°F Fl.Pt. = 60°F LEL: 3.4% UEL: 14.5% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.
1,3-Dichlorobenzene	541-73-1	https://cameochemicals.noaa.gov/chemical/8514				Inhalation, skin absorption, ingestion, skin and/or eye contact	INHALATION: Causes headache, drousiness, unsteadiness. Irritating to mucous membranes. EYES: Severe irritation. SKIN: Severe irritation. INGESTION: Irritation of gastric mucosa, nausea, vomiting, diarrhea, abdominal cramps and cyanosis.		Colorless liquid. Sinks in water. BP: 343°F Fl.Pt. = 146°F LEL: 2.02% UEL: 9.2%
1,4-Dichlorobenzene	106-46-7	TWA 10 ppm	Ca	TWA 75 ppm (450 mg/m3)	Ca [150 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; In Animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin	Colorless or white crystalline solid with a mothball-like odor. [insecticide] BP: 345°F Fl.Pt. = 150°F LEL: 2.5% UEL: NA Combustible Solid, but may take some effort to ignite.

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,4-Dioxane	123-91-1	TWA 20 ppm [skin]	Ca C 1 ppm (3.6 mg/m3) [30-minute]	TWA 100 ppm (360 mg/m3) [skin]	Ca [500 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin, nose, throat; drowsiness, headache; nausea, vomiting; liver damage; kidney failure; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys	Colorless liquid or solid (below 53°F) with a mild, ether-like odor. BP: 214°F Fl.Pt. = 55°F LEL: 2.0% UEL: 22% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F
2-Butanone	78-93-3	TWA 200 ppm STEL 300 ppm	TWA 200 ppm (590 mg/m3) ST 300 ppm (885 mg/m3)	TWA 200 ppm (590 mg/m3)	3000 ppm	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor BP: 175°F Fl.Pt. = 16°F LEL (200°F): 1.4% UEL (200°F): 11.4% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F
2-Hexanone	591-78-6	TWA 5 ppm STEL 10 ppm [skin]	TWA 1 ppm (4 mg/m3)	TWA 100 ppm (410 mg/m3)	1600 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; peripheral neuropathy: lassitude (weakness, exhaustion), paresthesia; dermatitis; headache, drowsiness	Eyes, skin, respiratory system, central nervous system, peripheral nervous system	Colorless liquid with an acetone-like odor BP: 262°F Fl.Pt. = 77°F LEL: NA UEL: 8.0% Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F
4-Methyl-2-pentanone	108-10-1	TWA 20 ppm STEL 75 ppm	TWA 50 ppm (205 mg/m3) ST 75 ppm (300 mg/m3)	TWA 100 ppm (410 mg/m3)	500 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; In Animals: liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a pleasant odor BP: 242°F Fl.Pt. = 64°F LEL (200°F): 1.2% UEL (200°F): 8.0% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F
Acetone	67-64-1	TWA 250 ppm STEL 500 ppm	TWA 250 ppm (590 mg/m^3)	TWA 1000 ppm (2400 mg/m^3)	2500 ppm [10% LEL]	Inhalation, ingestion, skin and/or eye contact	irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor BP: 133°F Fl.Pt. = 0°F LEL: 12.8% UEL: 2.5% Class IB Flammable liquid: Fl.P. below 73°F and BP at or above 100°F.
Benzene	71-43-2	TWA 0.5 ppm STEL 2.5 ppm	Ca TWA 0.1 ppm ST 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 IB Flammable liquid. Fl.P. below 73°F and BP at or above 100°F.
Bromochloromethane	74-97-5	TWA 200 ppm	TWA 200 ppm (1050 mg/m3)	TWA 200 ppm (1050 mg/m3)	2000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; confusion, dizziness, central nervous system depression; pulmonary edema	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless to pale-yellow liquid with a chloroform-like odor. [Note: May be used as a fire extinguishing agent.] BP: 155°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Liquid
Bromodichloromethane	75-27-4	https://cameochemicals.noaa.gov/chemical/16064				Inhalation, ingestion, skin and/or eye contact	Symptoms of exposure to this compound may include irritation of the skin, eyes, mucous membranes and respiratory tract. It may also cause narcosis. Other symptoms may include nausea, dizziness and headache.	Liver and kidney damage. Central nervous system effects may also occur.	Clear colorless liquid BP: 189°F Fl.Pt. = NA LEL: NA UEL: NA
Bromoform	75-25-2	TWA 0.5 ppm	TWA 0.5 ppm (5 mg/m3) [skin]	TWA 0.5 ppm (5 mg/m3) [skin]	850 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system; central nervous system depression; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless to yellow liquid with a chloroform-like odor. [Note: A solid below 47°F.] BP: 301°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Liquid
Bromomethane	74-83-9	TWA 1 ppm [skin]	Ca	C 20 ppm (80 mg/m3) [skin]	Ca [250 ppm]	Inhalation, skin absorption (liquid), skin and/or eye contact (liquid)	Irritation eyes, skin, respiratory system; muscle weak, incoordination, visual disturbance, dizziness; nausea, vomiting, headache; malaise (vague feeling of discomfort); hand tremor; convulsions; dyspnea (breathing difficulty); skin vesiculation; liquid: frostbite; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system	Colorless gas with a chloroform-like odor at high concentrations. [Note: A liquid below 38°F. Shipped as a liquefied compressed gas.] BP: 38°F Fl.Pt. = NA (Gas) LEL: 10% UEL: 16.0% Flammable Gas, but only in presence of a high energy ignition source.

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Carbon disulfide	75-15-0	TWA 1 ppm [skin]	TWA 1 ppm (3 mg/m3) ST 10 ppm (30 mg/m3) [skin]	TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)	500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	Central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	Colorless to faint-yellow liquid with a sweet ether-like odor. [Note: Reagent grades are foul smelling.] BP: 116°F Fl.Pt. = -22°F LEL: 1.3% UEL: 50.0% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.
Carbon tetrachloride	56-23-5	TWA 5 ppm STEL 10 ppm [skin]	Ca ST 2 ppm (12.6 mg/m3) [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 Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Liquid
Chlorobenzene	108-90-7	TWA 10 ppm	NA	TWA 75 ppm (350 mg/m3)	1000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; In Animals: liver, lung, kidney injury	Eyes, skin, respiratory system, central nervous system, liver	Colorless liquid with an almond-like odor BP: 270°F Fl.Pt. = 82°F LEL: 1.3% UEL: 9.6% Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.
Chloroethane	75-00-3	TWA 100 ppm [skin]	Handle with caution in the workplace	TWA 1000 ppm (2600 mg/m3)	3800 ppm [10%LEL]	Inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Liver, kidneys, respiratory system, cardiovascular system, central nervous system	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. [Note: Shipped as a liquefied compressed gas.] BP: 54°F Fl.Pt. = NA (gas), -58°F (liquid) LEL: 3.8% UEL: 15.4% Flammable Gas
Chloroform	67-66-3	TWA 10 ppm	Ca ST 2 ppm (9.78 mg/m3) [60-minute]	C 50 ppm (240 mg/m3)	Ca [500 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Liver, kidneys, heart, eyes, skin, central nervous system	Colorless liquid with a pleasant odor BP: 143°F Fl.Pt. = -82°F LEL: NA UEL: NA Noncombustible Liquid
Chloromethane	74-87-3	TWA 50 ppm STEL 100 ppm	Ca	TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 3 hours)	Ca [2000 ppm]	Inhalation, skin and/or eye contact (liquid)	Dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; liquid: frostbite; reproductive, teratogenic effects; [potential occupational carcinogen]	Central nervous system, liver, kidneys, reproductive system	Colorless gas with a faint, sweet odor which is not noticeable at dangerous concentrations. [Note: Shipped as a liquefied compressed gas.] BP: -12°F Fl.Pt. = NA (Gas) LEL: 8.1% UEL: 17.4% Flammable Gas
cis-1,2-Dichloroethene	156-59-2	TWA 200 ppm (All isomers)	TWA 200 ppm (790 mg/m3)	TWA 200 ppm (790 mg/m3)	1000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor. BP: 118-140°F Fl.Pt. = 36-39°F LEL: 5.6% UEL: 12.8% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F
cis-1,3-Dichloropropene	10061-01-5	https://cameochemicals.noaa.gov/chemical/20168				Inhalation, ingestion, skin and/or eye contact	Symptoms of exposure to this compound may include local irritation of the eyes skin and respiratory tract; dermatitis, gasping, coughing, substernal pain, extreme respiratory distress, lacrimation, central nervous system depression, skin irritation, acute gastrointestinal distress with pulmonary congestion and edema. It also may cause injury to the liver, kidneys and heart.	Skin, eyes, mucous membranes, liver, kidney, heart	Colorless to amber liquid with a sweetish odor. BP: 219.7°F Fl.Pt. = NA LEL: NA UEL: NA
Cyclohexane	110-82-7	TWA 100 ppm	TWA 300 ppm (1050 mg/m3)	TWA 300 ppm (1050 mg/m3)	1300 ppm [10%LEL]	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sweet, chloroform-like odor. [Note: A solid below 44°F.] BP: 177°F Fl.Pt. = 0°F LEL: 1.3% UEL: 8.0% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.
Dibromochloromethane	124-48-1	https://cameochemicals.noaa.gov/chemical/16183				Inhalation, ingestion, skin and/or eye contact	Symptoms of exposure to this compound may include irritation of the skin, eyes, mucous membranes and upper respiratory tract. It may also cause fatigue. Other symptoms may include central nervous system effects, lung and cornea irritation and liver and kidney damage. Prolonged exposure can cause nausea, dizziness, headache and narcosis.	Skin, eyes, mucous membranes, upper respiratory tract	Clear colorless to yellow-orange liquid BP: 246-248°F Fl.Pt. = Greater than 200°F LEL: NA UEL: NA

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Dichlorodifluoromethane	75-71-8	TWA 1000 ppm	TWA 1000 ppm (4950 mg/m3)	TWA 1000 ppm (4950 mg/m3)	15,000 ppm	Inhalation, skin and/or eye contact (liquid)	Dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite	Cardiovascular system, peripheral nervous system	Colorless gas with an ether-like odor at extremely high concentrations. [Note: Shipped as a liquefied compressed gas.] BP: -22°F Fl.Pt. = NA LEL: NA UEL: NA Nonflammable Gas
Ethyl benzene	100-41-4	TWA 20 ppm	TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)	TWA 100 ppm (435 mg/m^3)	800 ppm [10%LEL]	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with an aromatic odor. BP: 277°F Fl.Pt. = 55°F LEL: 0.8% UEL: 6.7% Class IB Flammable Liquid below 73°F and BP at or above 100°F
Isopropyl benzene	98-82-8	TWA 5 ppm	TWA 50 ppm (245 mg/m3) [skin]	TWA 50 ppm (245 mg/m3) [skin]	900 ppm [10%LEL]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor BP: 306°F Fl.Pt. = 96°F LEL: 0.9% UEL: 6.5% Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F
Methyl Acetate	79-20-9	TWA 200 ppm STEL 250 ppm	TWA 200 ppm (610 mg/m3) ST 250 ppm (760 mg/m3)	TWA 200 ppm (610 mg/m3)	3100 ppm [10%LEL]	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; headache, drowsiness; optic nerve atrophy; chest tightness; In Animals: narcosis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, fruity odor BP: 135°F Fl.Pt. = 14°F LEL: 3.1% UEL: 16% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.
Methylcyclohexane	108-87-2	TWA 400 ppm	TWA 400 ppm (1600 mg/m3)	TWA 500 ppm (2000 mg/m3)	1200 ppm [LEL]	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, drowsiness; In Animals: narcosis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a faint, benzene-like odor BP: 214°F Fl.Pt. = 25°F LEL: 1.2% UEL: 6.7% Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.
Methylene chloride	75-09-2	TWA 50 ppm [skin] STEL 100 ppm	Ca	[1910.1052] TWA 25 ppm ST 125 ppm	Ca [2300 ppm]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numb, tingle limbs; nausea; [potential occupational carcinogen]	Eyes, skin, cardiovascular system, central nervous system	Colorless liquid with a chloroform-like odor. [Note: A gas above 104°F.] BP: 104°F Fl.Pt. = NA LEL: 13% UEL: 23% Combustible Liquid
Methyl-t-butyl ether	1634-04-4	TWA 50 ppm	NA	NA	NA	Inhalation, skin absorption, ingestion, skin and/or eye contact	May cause dizziness or suffocation. Contact may irritate or burn eyes or skin. May be harmful if swallowed.	Eyes, skin	A colorless liquid with a distinctive anesthetic-like odor. BP: 131°F Fl.Pt. = -14°F LEL: NA UEL: NA
o-Xylene	95-47-6	TWA 20 ppm (All isomers)	TWA 100 ppm (435 mg/m3) ST 150 ppm (655 mg/m3)	TWA 100 ppm (435 mg/m3)	900 ppm	Inhalation, skin absorption, 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: 292°F Fl.Pt. = 90°F LEL: 0.9% UEL: 6.7% Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F
Styrene	100-42-5	TWA 10 ppm STEL 20 ppm OTO (ototoxicant)	TWA 50 ppm (215 mg/m3) ST 100 ppm (425 mg/m3)	TWA 100 ppm C 200 ppm 600 ppm (5-minute maximum peak in any 3 hours)	700 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects	Eyes, skin, respiratory system, central nervous system, liver, reproductive system	Colorless to yellow, oily liquid with a sweet, floral odor BP: 293°F Fl.Pt. = 88°F LEL: 0.9% UEL: 6.8% Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm	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 Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Sodium Hydroxide	1310-73-2	Ceiling 2 mg/m^3	C 2 mg/m^3	TWA 2 mg/m^3	10 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair	Eyes, skin, respiratory system	Colorless to white, odorless solid (flakes, beads, granular form). BP: 2534°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid, but when in contact with water may generate sufficient heat to ignite combustible materials.
Sulfuric Acid	7664-93-9	TWA 0.2 mg/m^3 (as thoracic particulate mass)	TWA 1 mg/m^3	TWA 1 mg/m^3	15 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis	Eyes, skin, respiratory system, teeth	Colorless to dark-brown, oily, odorless liquid.[Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.] BP = 554°F Fl.Pt. = NA LEL = NA UEL = NA Noncombustible Liquid, but capable of igniting finely divided combustible materials.
trans-1,2-Dichloroethene	156-60-5	200 ppm (All isomers)	TWA 200 ppm (790 mg/m3)	TWA 200 ppm (790 mg/m3)	1000 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor. BP: 118-140°F Fl.P: 36-39°F LEL: 5.6% UEL: 12.8% Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F.
trans-1,3-Dichloropropene	10061-02-6	https://cameochemicals.noaa.gov/chemical/18110				Inhalation, ingestion, skin and/or eye contact	Symptoms of exposure to this compound may include local irritation of the eyes skin and respiratory tract, dermatitis, gasping, coughing, substernal pain, extreme respiratory distress, lacrimation, central nervous system depression, acute gastrointestinal distress with pulmonary congestion and edema. It may also cause injury to the liver, kidneys and heart	Skin, eyes, mucous membranes, liver, kidney, heart	A clear colorless liquid with chloroform odor BP: 234°F Fl.P: NA LEL: NA UEL: NA
Toluene	108-88-3	TWA 20 ppm (ototoxicant)	TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, pungent, benzene-like odor. BP: 232°F Fl.P: 40°F LEL: 1.1% UEL: 7.1% Class IB Flammable Liquid Fl.P. below 73°F and BP at or above 100°F.
Trichloroethene (TCE)	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 Fl.Pt. = NA LEL(77°F): 8.0% UEL(77°F): 10.5% Combustible Liquid, but burns with difficulty.
Trichlorofluoromethane	75-69-4	STEL C 1000 ppm	C 1000 ppm (5600 mg/m3)	TWA 1000 ppm (5600 mg/m3)	2000 ppm	Inhalation, ingestion, skin and/or eye contact	Incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia; liquid: frostbite	Skin, respiratory system, cardiovascular system	Colorless to water-white, nearly odorless liquid or gas (above 75°F) BP: 75°F Fl.P: NA LEL: NA UEL: NA Noncombustible Liquid Nonflammable Gas
Vinyl Chloride (chloroethylene)	75-01-4	TWA 1 ppm	Ca	TWA 1 ppm C 5 ppm [15-minute]	Ca (ND)	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.[Note: Shipped as a liquefied compressed gas.] BP: 7°F Fl.Pt. = NA (Gas) LEL: 3.6% UEL: 33.0% Flammable Gas
Xylene (m, o & p isomers)	108-38-3, 95-47-6, 106-42-3	TWA 20 ppm	NA	NA	NA	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Colorless liquid with an aromatic odor BP: 282°F, 292°F, 281°F Fl. Pt. 82°F, 90°F, 81°F LEL: 1.1%, 0.9%, 1.1% UEL: 7.0%, 6.7%, 7.0% Class IC Flammable Liquid at or above 73°F and below 100°F.
Zinc Oxide (dust)	7440-66-6	TWA 2 mg/m3 (repsirable) STEL 10 mg/m^3 (respirable)	TWA 5 mg/m^3 C 15 mg/m^3	TWA 15 mg/m^3 (total dust) TWA 5 mg/m^3 (resp dust) TWA 5 mg/m^3 (fume)	500 mg/m^3	Inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Respiratory system	White, odorless solid. BP: NA Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)									
2-Chloronaphthalene	91-58-7	https://cameochemicals.noaa.gov/chemical/16185				Inhalation, ingestion, skin and/or eye contact	Chloracne, cysts, headache, fatigue, vertigo, anorexia and jaundice		Monoclinic plates or off-white crystalline powder BP: NA Fl.Pt. = NA LEL: NA UEL: NA
2-Methylnaphthalene	91-57-6	TWA 0.5 ppm TLV-SL 3 mg/100 cm2 [skin]	https://cameochemicals.noaa.gov/chemical/20668			Inhalation, ingestion, skin and/or eye contact	Headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose	Skin, eyes, mucous membranes and upper respiratory tract	White crystalline solid Combustible solid BP: 466-468 ° F Fl.Pt. = 208 ° F LEL: NA UEL: NA
Acenaphthene	83-32-9	https://cameochemicals.noaa.gov/chemical/10358				Inhalation, ingestion, skin and/or eye contact	Irritation of the skin, eyes, mucous membranes and upper respiratory tract, vomiting	Skin, eyes, mucous membranes and upper respiratory tract	White needles BP: 534 ° F Fl.Pt. = NA LEL: 0.6% UEL: NA
Acenaphthylene	208-96-8	https://cameochemicals.noaa.gov/chemical/16157				Inhalation, ingestion, skin and/or eye contact			Colorless crystalline solid BP: 509 to 527 ° F at 760 mm Hg Fl.Pt. = NA LEL: NA UEL: NA
Anthracene (as coal tar pitch volatiles)	120-12-7	TWA 0.2 mg/m3 (as Benzene solubles)	Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002]	Ca [80 mg/m3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue BP: NA Fl.Pt. = NA LEL: NA UEL: NA Combustible Solids
Benzo[a]anthracene	56-55-3	https://cameochemicals.noaa.gov/chemical/16171				Inhalation, injestion, skin and/or eye contact			Colorless leaflets or plates or coarse gold powder with a greenish-yellow fluorescence. May reasonably be expected to be a carcinogen. BP: 815° F at 760 mm Hg Fl.Pt. = NA LEL: NA UEL: NA
Benzo[a]pyrene (as coal tar pitch volatiles)	50-32-8	TWA 0.2 mg/m3 (as Benzene solubles)	Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002]	Ca [80 mg/m3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue BP: NA Fl.Pt. = NA LEL: NA UEL: NA Combustible Solids
Benzo[b]fluoranthene	205-99-2	None listed	https://cameochemicals.noaa.gov/chemical/16172			Inhalation, injestion, skin and/or eye contact			Needles or yellow fluffy powder BP: NA Fl.Pt. = NA LEL: NA UEL: NA
Benzo[g,h,i]perylene	191-24-2	https://cameochemicals.noaa.gov/chemical/16174				Inhalation, injestion, skin and/or eye contact	Inhalation of material may be harmful. Contact may cause burns to skin and eyes. Inhalation of Asbestos dust may have a damaging effect on the lungs. Fire may produce irritating, corrosive and/or toxic gases. Some liquids produce vapors that may cause dizziness or suffocation. Runoff from fire control may cause pollution.	Lungs, skin, eyes	Colorless to white crystalline solid. Water insoluble. BP: NA Fl.Pt. = NA LEL: NA UEL: NA
Benzo[k]fluoranthene	207-08-9	https://cameochemicals.noaa.gov/chemical/16173				Inhalation, injestion, skin and/or eye contact	When heated to decomposition this compound emits acrid smoke and irritating fumes.		Pale yellow needles or yellow crystalline solid BP: 896° F Fl.Pt. = NA LEL: NA UEL: NA
Chrysene (as coal tar pitch volatiles	218-01-9	TWA 0.2 mg/m3 (as Benzene solubles)	Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002]	Ca [80 mg/m3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue BP: NA Fl.Pt. = NA LEL: NA UEL: NA Combustible Solids
Dibenzo(a,h)anthracene	53-70-3	https://cameochemicals.noaa.gov/chemical/16192				Inhalation, injestion, skin and/or eye contact	Symptoms of exposure to this compound may include irritation. This compound is harmful if swallowed or inhaled. It may cause irritation. When heated to decomposition it emits acrid smoke, irritating fumes and toxic fumes of carbon monoxide and carbon dioxide.	Lungs	White crystals or pale yellow solid. Sublimes BP: 975° F Fl.Pt. = NA LEL: NA UEL: NA

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Fluoranthene	206-44-0	https://cameochemicals.noaa.gov/chemical/16213				Inhalation, injestion, skin and/or eye contact	When heated to decomposition this compound emits acrid smoke and fumes.		Light yellow fine crystals BP: 482° F Fl.Pt. = NA LEL: NA UEL: NA
Fluorene	86-73-7	https://cameochemicals.noaa.gov/chemical/16214				Inhalation, injestion, skin and/or eye contact			White leaflets. Sublimes easily under a vacuum. Fluorescent when impure. BP: 563° F Fl.Pt. = NA LEL: NA UEL: NA
Indeno[1,2,3-cd]pyrene	193-39-5	https://cameochemicals.noaa.gov/chemical/16218				Inhalation, injestion, skin and/or eye contact			Yellow crystals BP: 997° F Fl.Pt. = NA LEL: NA UEL: NA
Naphthalene	91-20-3	TWA 10 ppm [skin]	TWA 10 ppm (50 mg/m3) ST 15 ppm (75 mg/m3)	TWA 10 ppm (50 mg/m3)	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. [Note: Shipped as a molten solid.] BP: 424°F Fl.P: 174°F LEL: 0.9% UEL: 5.9% Combustible Solid, but will take some effort to ignite
Phenanthrene	85-01-8	https://cameochemicals.noaa.gov/chemical/16236				Inhalation, injestion, skin and/or eye contact	Symptoms following exposure to this compound may include skin sensitization, dermatitis, bronchitis, cough, dyspnea, respiratory neoplasm, kidney neoplasm, skin irritation, and respiratory irritation.	Skin, respiratory tract	Colorless monoclinic crystals with a faint aromatic odor. Solutions exhibit a blue fluorescence. BP: 642° F Fl.Pt. = 340° F LEL: NA UEL: NA
Pyrene (see coal tar pitch volatiles)	129-00-0	TWA 0.2 mg/m3 (as Benzene solubles)	Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction)	TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002]	Ca [80 mg/m3]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue BP: NA Fl.Pt. = NA LEL: NA UEL: NA Combustible Solids
METALS									
Aluminum	7429-90-5	TWA 1 mg/m3	TWA 10 mg/m^3 (total) TWA 5 mg/m^3 (resp)	TWA 15 mg/m^3 (total) TWA 5 mg/m^3 (resp)	N.D.	Inhalation, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Silvery-white, malleable, ductile, odorless metal BP: 4221°F Fl.Pt. = NA LEL: NA UEL: NA Combustible Solid, finely divided dust is easily ignited; may cause explosions.
Antimony	7440-36-0	TWA 0.5 mg/m3 (as Sb)	TWA 0.5 mg/m3 [*Note: The REL also applies to other antimony compounds (as Sb).]	TWA 0.5 mg/m3 [*Note: The PEL also applies to other antimony compounds (as Sb).]	50 mg/m3 (as Sb)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	Eyes, skin, respiratory system, cardiovascular system	Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder BP: 2975°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame.
Arsenic	7440-38-2	TWA 0.01 mg/m3	Ca C 0.002 mg/m3 [15-minute]	[1910.1018] TWA 0.010 mg/m3	Ca [5 mg/m3 (as As)]	Inhalation, skin absorption, skin and/or eye contact, ingestion	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Liver, kidneys, skin, lungs, lymphatic system	Metal: Silver-gray or tin-white, brittle, odorless solid BP: Sublimes Fl.Pt. = NA LEL: NA UEL: NA Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame
Barium	7440-39-3	TWA 0.5 mg/m3	0.5 mg Ba/m3 TWA	0.5 mg Ba/m3 TWA	50 mg Ba/m3	Inhalation, ingestion, skin and/or eye contact	Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death. Contact may cause burns to skin, eyes, and mucous membranes. May be toxic by ingestion, inhalation and skin absorption. Used to make other chemicals.	Lungs, skin, eyes, and mucous membrane	A silver to white metallic solid BP: 1337°F Fl.Pt. = NA LEL: NA UEL: NA
Beryllium	7440-41-7	TWA 0.00005 mg/m^3	Ca C 0.0005 mg/m^3	TWA 0.002 mg/m^3 C 0.005 mg/m^3 0.025 mg/m3 [30-minute maximum peak]	Ca [4 mg/m^3 (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	Hard, brittle, gray-white solid BP: 4532°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid in bulk form, but a slight explosion hazard in the form of a powder or dust.

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Cadmium	7440-43-9	TWA 0.01 mg/m^3 total dust TWA 0.002 mg/m^3 (as Cd) respirable fraction	Ca	TWA 0.005 mg/m^3	Ca [9 mg/m3 (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	Silver-white/blue tinged lustrous, odorless solid. BP: 1409°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible - will burn in powder form
Calcium	7440-70-2	https://cameochemicals.noaa.gov/chemical/309				Inhalation, ingestion, skin and/or eye contact	Contact with eyes or skin produces caustic burns.	Eyes, skin	A silvery, soft metal that turns grayish white on exposure to air. BP: 2714°F Fl.Pt. = NA LEL: NA UEL: NA
Chromium	7440-47-3	TWA 0.5 mg/m^3 (metal) TWA 0.003 mg/m^3 (water-soluble Cr III compounds) TWA 0.0002 mg/m^3 (water-soluble Cr VI compounds) STEL 0.0005 mg/m3 (water-soluble Cr VI compounds)	TWA 0.5 mg/m^3	TWA 1 mg/m^3	250 mg/m^3 (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 Fl.Pt. = NA LEL: NA UEL: NA Noncombustible - will burn in dust form if heated in a flame
Cobalt	7440-48-4	TWA 0.02 mg/m3 [DSEN] [RSEN]	TWA 0.05 mg/m3	TWA 0.1 mg/m3	20 mg/m3 (as Co)	Inhalation, ingestion, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; resp hypersensitivity, asthma	Skin, respiratory system	Odorless, silver-gray to black solid BP: 5612°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.
Copper	7440-50-8	TWA 0.2 mg/m^3 (fume) TWA 1 mg/m3 (dusts and mists)	TWA 1 mg/m^3	TWA 1 mg/m^3	100 mg/m^3 (as Cu)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, pharynx; nasal septum perforation; metallic taste; dermatitis; In Animals: lung, liver, kidney damage; anemia	Eyes, skin, respiratory system, liver, kidneys (increased risk with Wilson's disease)	Reddish, lustrous, malleable, odorless solid. BP: 4703°F Fl.Pt. = NA LEL: NA UEL: NA Noncombustible - powdered form may ignite
Iron (as iron oxide)	7439-89-6	TWA 5 mg/m3 (respirable particulate mass)	TWA 1 mg/m^3	NA	NA	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting; possible liver damage	Eyes, skin, respiratory system, liver, gastrointestinal tract	Appearance and odor vary depending upon the specific soluble iron salt. BP: NA Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solids
Lead	7439-92-1	TWA 0.05 mg/m3	TWA (8-hour) 0.050 mg/m3	[1910.1025] TWA 0.050 mg/m3	100 mg/m3 (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 Fl.Pt. = NA LEL: NA UEL: NA Noncombustible Solid in bulk form
Magnesium	7439-95-4	https://cameochemicals.noaa.gov/chemical/6949				Eye and/or skin contact	Dust irritates eyes in same way as any foreign material. Penetration of skin by fragments of metal is likely to produce local irritation, blisters, and ulcers which may become infected.	Eyes	A light silvery metal BP: 1202°F Fl.Pt. = NA LEL: NA UEL: NA
Manganese	7439-96-5	TWA 0.02 mg/m3 [R] TWA 0.1 mg/m3 [I]	TWA 1 mg/m3 ST 3 mg/m3	C 5 mg/m3	500 mg/m3 (as Mn)	inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid BP: 3564°F Fl.Pt. = NA LEL: NA UEL: NA Metal: Combustible Solid
Mercury	7439-97-6	TWA 0.1 mg/m3, as Hg Aryl compounds TWA 0.025 mg/m3 as Hg, inorganic forms including metallic mercury	Hg Vapor: TWA 0.05 mg/m3 [skin] Other: C 0.1 mg/m3 [skin]	TWA 0.1 mg/m3	10 mg/m3 (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 Fl.Pt. = NA LEL: NA UEL: NA Metal: Noncombustible Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Nickel	7440-02-0	TWA 1.5 mg/m^3 [elemental] TWA 0.1 mg/m^3 [soluble inorganic compound] TWA 0.2 mg/m^3 [insoluble inorganic compound] TWA 0.1 mg/m^3 [Nickel subsulfide]	Ca TWA 0.015 mg/m^3	TWA 1 mg/m^3	Ca [10 mg/m3 (as Ni)]	Inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Nasal cavities, lungs, skin	Lustrous, silvery, odorless solid. BP: 5139°F Fl.Pt. = NA LEL: NA UEL: NA Combustible Solid; nickel sponge catalyst may ignite spontaneously in air.
Potassium	9/7/7440	https://cameochemicals.noaa.gov/chemical/4289				Eye and/or skin contact	Will burn skin and eyes	Skin, eyes	Potassium is a soft silvery metal though normally grayish white due to oxidation BP: 1425°F Fl.Pt. = NA LEL: NA UEL: NA
Selenium	7782-49-2	TWA 0.2 mg/m3	TWA 0.2 mg/m3	TWA 0.2 mg/m3	1 mg/m3 (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 Fl.Pt. = NA LEL: NA UEL: NA Combustible Solid
Silver	7440-22-4	TWA 0.1 mg/m3 [Metal, dust, and fume] TWA 0.01 mg/m3 [Soluble compounds, as Ag]	TWA 0.01 mg/m3	TWA 0.01 mg/m3	10 mg/m3 (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 Fl.Pt. = NA LEL: NA UEL: NA Metal: Noncombustible Solid, but flammable in form of dust or powder
Sodium	7440-23-5	https://cameochemicals.noaa.gov/chemical/7794				Skin contact	Severe burns caused by burning metal or by caustic soda formed by reaction with moisture on skin	Skin	A silvery soft metal that becomes grayish white upon exposure to air BP: 1621°F Fl.Pt. = NA LEL: NA UEL: NA
Thallium	7440-28-0	0.02 mg/m3 inhallable particulate matter	TWA 0.1 mg/m3 [skin]	TWA 0.1 mg/m3 [skin]	15 mg/m3 (as Tl)	Inhalation, skin absorption, ingestion, skin and/or eye contact	Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, body hair	Appearance and odor vary depending upon the specific soluble thallium compound BP: NA Fl.Pt. = NA LEL: NA UEL: NA
Vanadium	7440-62-2	https://cameochemicals.noaa.gov/chemical/16147				Inhalation, skin absorption, ingestion, skin and/or eye contact	Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution	Skin	Silvery-whitish powder BP: NA Fl.Pt. = NA LEL: NA UEL: NA
Zinc	7440-66-6	https://cameochemicals.noaa.gov/chemical/4814				Inhalation, skin absorption, ingestion, skin and/or eye contact	Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death. May produce corrosive solutions on contact with water. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution	Lungs	A grayish powder BP: NA Fl.Pt. = NA LEL: NA UEL: NA
PCBs									
PCBs (total)	11097-69-1, 53469-21-9	TWA 0.5 mg/m3 [skin] TWA 1 mg/m3 [skin]	Ca TWA 0.001 mg/m3 Ca TWA 0.001 mg/m3	TWA 0.5 mg/m3 [skin] TWA 1 mg/m3 [skin]	Ca [5 mg/m3] Ca [5 mg/m3]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]	Skin, eyes, liver, reproductive system	Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor BP: 689-734°F, 617-691°F Fl.Pt. = NA, NA LEL: NA UEL: NA Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.
Petroleum Hydrocarbons									
Gasoline	86290-81-5	TWA 300 ppm STEL 500 ppm	Ca	None	Ca [N.D.]	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Clear liquid with a characteristic odor BP: 102°F Fl.Pt. = -45°F LEL: 1.4% UEL: 7.6%

References

Centers for Disease Control and Prevention, 2018. *NIOSH Pocket Guide to Chemical Hazards.* The National Institute for Occupational Safety and Health.

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National Oceanic and Atmospheric Administration (NOAA) and Environmental Protection Agency (EPA), 2019. *CAMEO Chemicals Database* . https://cameochemicals.noaa.gov/

U.S. Department of Labor, 1990. *OSHA Regulated Hazardous Substances.* Industrial Exposure and Control Technologies Government Institutes, Inc.

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at the Site.

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties

Sax, N. Van Nostrand and Reinhold Company, 1987. *Hawley's Condensed Chemical Dictionary, 11th Edition.*
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.

Abbreviations:
ACGIH – American Conference of Governmental Industrial Hygienists.
BP – boiling point at 1 atmosphere, °F
C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.
Ca – Carcinogenic.
CAS# - Chemical Abstracts Service registry number which is unique for each chemical.
DSEN - Dermal Sensitization
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^3 – Milligrams of substance per cubic meter of air
NIOSH - National Institute for Occupational Safety and Health.
OSHA – Occupational Safety and Health Administration
OTO - Ototoxicant
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
RSEN - Respiratory Sensitization
SG - Specific Gravity
STEL – ACGIH 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

FIGURES

1. Site Location Map
2. Site Plan
3. Route to Hospital and Urgent Care

QUADRANGLE LOCATION

N

1,000 0 1,000'

Title:

SITE LOCATION MAP

580-610 GERARD AVENUE
BRONX, NY

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: E.T.	Date: 10/12/21
Prepared by: M.S.R.	Scale: AS SHOWN
Project Mgr: J.L.	Project: 3523.0001Y000
File: 3523.0001Y107.1.mxd	

FIGURE 1

V:\GIS\PROJECTS\3523\0001Y\107\3523.0001Y107.1.MXD

LEGEND

SITE BOUNDARY

EMERGENCY MUSTER AREA

N

75 0 75'

Title:

SITE PLAN WITH EMERGENCY MUSTER AREA

580-610 GERARD AVENUE
BRONX, NY

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: E.T.	Date: 10/12/21	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	2
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y107.2.mxd		

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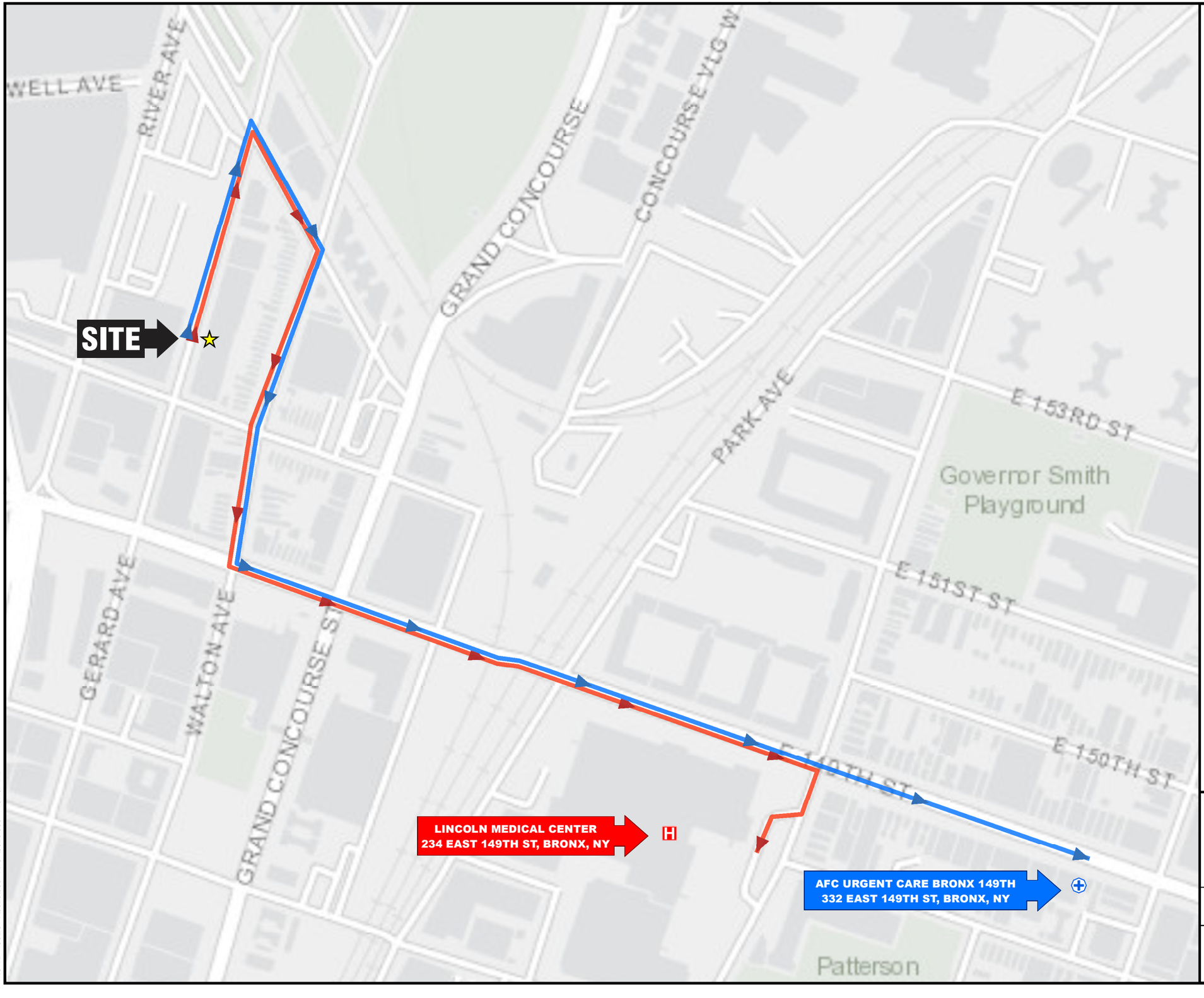

N

DIRECTIONS TO HOSPITAL

1. HEAD NORTH ON GERARD AVE TOWARD E 151ST ST
2. TURN RIGHT ONTO E 151ST ST
3. TURN RIGHT AT THE 1ST CROSS STREET ONTO WALTON AVE
4. TURN LEFT ONTO E 149TH ST
5. TURN RIGHT ONTO MORRIS AVE & DESTINATION WILL BE ON RIGHT

DIRECTIONS TO URGENT CARE

1. HEAD NORTH ON GERARD AVENUE TOWARDS EAST 151ST STREET.
2. TURN RIGHT ONTO EAST 151ST STREET.
3. TURN RIGHT AT THE 1ST CROSS STREET ONTO WALTON AVENUE.
4. TURN LEFT ONTO EAST 149TH STREET AND THE DESTINATION WILL BE AHEAD ON THE RIGHT

200 0 200'

Title:

ROUTES TO URGENT CARE AND HOPSITAL

580-610 GERARD AVENUE
BRONX, NY

Prepared for:

SB GERARD AVENUE LLC

ROUX

Compiled by: E.T.	Date: 10/12/21	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	3
Project Mgr: J.L.	Project: 3523.0001Y000	
File: 3523.0001Y107.3.mxd		

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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. Personal Protective Equipment (PPE) Management Program
E. Subsurface Utility Clearance Management Program
F. Heavy Equipment Exclusion Zone Policy
G. Incident Investigation and Reporting Management Program
H. Heat Illness Prevention Program
I. Community Air Monitoring Program

APPENDIX A

Job Safety Analysis (JSA) Forms

JOB SAFETY ANALYSIS	Ctrl. No. CVD-19	DATE: 04/10/2023	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
Generic	**Fieldwork**	**Working in Areas Affected by Coronavirus**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Kristina DeLuca	Health and Safety Specialist	Brian Hobbs	CHSD
		Ray Greenidge	Sr. Compliance Mgr.

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES – Leather/cut-resistant in field and nitrile as needed
☒ HARD HAT – In field	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING – High visibility vest in field	☒ Face Covering
☒ SAFETY GLASSES – In field	☒ SAFETY SHOES – Steel/composite toe in fie		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Cloth face covering, nitrile gloves, hand soap, water source, hand sanitizer, disinfectant spray and disinfectant wipes.

Commitment to Safety – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

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.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Project Preplanning	N/A	• Review and follow COVID-19 CDC, Roux, Client and local orders/protocols. • 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. • 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. • Use the minimum number of employees necessary to safely complete the work.
2. Mobilization	**Exposure:** Becoming infected or infecting co-workers	**Personal/Rental/Roux Owned Vehicle** • Do not carpool, unless all individuals are fully vaccinated. • Verify workers/other people are not approaching vehicle prior to exiting the vehicle. Maintain 6' of distance from general public, as appropriate. **Public Transportation** • 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. **Hotel Stay (Refer to COVID-19 H&S Guidance for more info)** • If a hotel stay is deemed necessary for the given field work, ensure that you clean your room upon initial arrival. • 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.
3. Tailgate Meeting	**Exposure:** Becoming infected or infecting co-workers	• Perform outside or indoors in areas with ample ventilation. • If unvaccinated, maintain at least a 6+ ft distance between you and others. • Discuss primary infection prevention measures listed below. • 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.

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[3] 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	**Exposure:** Becoming infected or infecting co-workers	• 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. • Don cloth face coverings as appropriate. • 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. • Minimize shaking hands or touching others. • Minimize sharing of equipment or other items with co-workers and subcontractors unless wearing appropriate PPE (e.g. nitrile gloves), as appropriate. • If anyone is experiencing COVID-19 signs or symptoms in your vicinity, stop work and leave the area. • Do not work in areas with limited ventilation with others. • 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. • Clean work surfaces/areas with approved cleaners you're responsible for (ex: desk, office doorknob, computer, etc.) at least daily. • 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.

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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JOB SAFETY ANALYSIS	Ctrl. No. GEN-006	DATE 4/10/2023	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY:	WORK TYPE:	WORK ACTIVITY (Description):	
Generic	**Drilling**	**Direct Push Soil Borings / Well Installation**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Timothy Zei	Project Hydrogeologist	Raymond Olson	OHSM
		Brian Hobbs	CHSD

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing, Long Sleeve Shirt	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

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

COMMITMENT TO SAFETY- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

EXCLUSION ZONE (EZ): 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.

"SHOW ME YOUR HANDS"
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	**1a. CONTACT:** Equipment/property damage.	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 **exclusion zone which encompasses its tip radius** for non-essential personnel (i.e., driller helper, geologist) when the rig is moving/ in operation.
	1b. FALL: Slip/trip/fall hazards.	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. CONTACT: Crushing from roll-over.	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. CONTACT:** Overhead hazards.	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. CONTACT: Pinch Points/Amputation Points when raising the rig and instability of rig	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. CONTACT:** Flying debris	3a. Be aware of and avoid potential line-of-fire hazards and wear required PPE such as eye, ear, and hand protection.
	3b. EXPOSURE: Noise and dust.	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.
Assess [1]JOB STEPS	**Analyze [2]POTENTIAL HAZARDS**	**Act [3]CRITICAL ACTIONS**

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3. Advancement of drilling equipment and well installation (Continued)	**3a. CONTACT:** Flying debris **3b. EXPOSURE:** Noise and dust. **3c. FALL:** Slip/trip/fall hazards. **3d. CAUGHT:** Limb/extremity pinching; abrasion/crushing. **3e. CONTACT:** Equipment imbalance during advancement of drill equipment. **3f. EXPOSURE:** Inhalation of contamination/vapors. **3g. EXERTION:** Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.	3c. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area. 3c. See 1b. 3d. Ensure all Emergency Safety Stop buttons function properly. 3d. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 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. 3d. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3d. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3d. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. 3d. Drillers and helpers will understand and use the "Show Me Your Hands" Policy. 3d. Spinning rods/casing have an **exclusion zone of tip radius** while in operation. 3e. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 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. 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 (**minimum exclusion zone**). 3f. Monitor ambient air for dangerous conditions using a calibrated photoionization detector (PID) to periodically monitor the breathing zone of the work area. 3f. If a reading of >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. 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). 3g. Keep back straight and bend at the knees. 3g. Utilize team lifting or mechanical means for objects over 50lbs. 3g. Use mechanical lifting device for odd shaped objects.
4. Remove sample liner.	**4a. EXERTION:** Potential for muscle strain/injury while removing liner from probe rod. **4b. CONTACT:** Pinch points and cuts **4c. EXPOSURE:** Inhalation and/or dermal contact with contaminants.	4a Utilize team lifting or mechanical means for objects over 50lbs. 4a. Use hydraulic liner extruder if available. 4b. Place liner on sturdy surface when opening. 4b. Don cut-resistant gloves and use appropriate liner cutter when opening liners. 4b. Always cut away from the body. 4c. Wear chemical-resistant disposable gloves when handling liners. 4c. See 3f.
5. Decontaminate equipment.	**5a. EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors). **5b. EXPOSURE:** To chemicals in cleaning solution including ammonia.	5a. Wear chemical-resistant disposable gloves and safety glasses. 5a. Contain decontamination water so that it does not spill. 5a. Use an absorbent pad to clean spills, if necessary. 5a. Spray equipment from side angle, not straight on, to avoid backsplash. 5a. See 3b and 3f. 5b. See 4a. Review SDS to ensure appropriate precautions are taken and understood.

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JOB SAFETY ANALYSIS	Ctrl. No. GEN-007	DATE 4/10/2023	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**General Site Activity**	**Driving**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Valerie Sabatasso	Project Scientist	Brian Hobbs	CHSD

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Leather/ cut-resistant level 2
☒ HARD HAT: when outside vehicle	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER _____
☐ LIFELINE / BODY HARNESS	☒ HEARING PROTECTION	☒ PPE CLOTHING: high visibility vest, when outside vehicle	
☒ SAFETY GLASSES:when outside vehicle	☒ SAFETY TOE BOOTS: when outside vehicle		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Motor Vehicle (i.e. car, truck, SUV)

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Driving to/leaving Site	**1a. CONTACT:** 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. *Common factors that may lead to CONTACT incident, but not limited to: • distracted driving (cell phone, GPS, radio, billboards, "rubber necking") • lack of situational awareness • unfamiliarity with traffic patterns/road layout • weather conditions (wet/icy roads, hydroplaning, black ice) • weariness • high speeds • obstructed vision (solar glare, debris on windshield, blind spots, large vehicle at the front) • changes in travel pathway (construction, snow banks, non-operational signals, potholes, detours, special events) • improper vehicle maintenance (non-operational signal light, worn tires, cracked windshield, ineffective wipers) • loose or unsecure objects	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. 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. 1a. Do not hang items in car that can obstruct your view or become projectiles in a collision. 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. 1a. Follow posted speed limits and obey traffic signals and roadway signs. 1a. Always wear your seat belt and shoulder harness when driving. 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. 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. 1a. Apply the Smith Five Keys® of safe driving • Aim High in Steering® - Expand eye lead time to a minimum of 15 seconds • Get the Big Picture® - Maintain proper a 4 second minimum following distance at all times - Scan mirrors every 5-8 seconds to achieve a circle of awareness - Position your vehicle so you can see relevant/non-relevant objects • Keep Your Eyes Moving® - Try to maintain about 180 degrees of visibility - Avoid blank and fixed stares. Avoid focusing on one object for more than 2 seconds • Leave Yourself an Out® - Avoid traveling in traffic clusters - Surround yourself with space - Anticipate the actions of others

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Driving to/leaving Site (cont'd)	**1a. CONTACT:** 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.	• Make Sure They See You® - Maintain eye contact with on-coming vehicles/pedestrians - Use warning devices (e.g., hand signals, high-lights, horns etc.) - Proper timing is essential 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 1a. Avoid sudden turns and stops. Don't drive recklessly – be in control of vehicle at all times. 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 the 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) 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. 1a. Never operate a vehicle under the influence of alcohol or illegal substances or medications affecting your performance. 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. 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.
2. Entering/Exiting Vehicle.	**2a. CAUGHT:** Personal injury (broken fingers/hand) while entering or exiting vehicles **2b. FALL:** 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 **2c. CONTACT:** 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.	2a. Open and close doors slowly. Never put hands or feet in between door and vehicle to avoid pinch points. 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. 2c. Check both directions for traffic before opening door. Do not exit vehicle if traffic does not permit you to exit safely 2c. Check anticipated path of door prior to opening, do not open door into any obstructions (e.g., bollards, high curbing)

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JOB SAFETY ANALYSIS Ctrl. No. GEN-013	DATE 4/10/2023	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE:	WORK ACTIVITY (Description):	
Generic	**Gauging and Sampling**	**Gauging and Sampling**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Tim Unalp	SHSO	Brian Hobbs	CHSD

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☒ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☐ HEARING PROTECTION ☒ SAFETY SHOES: Composite-toed or steel-toed boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Knee pads, Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

42-inch Safety Cones, Caution Tape, Interface Probe with Ground Clamp, 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.

COMMITMENT TO SAFETY- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization to monitoring well(s).	**1a. FALL:** Personal injury from slip/trip/fall due to uneven terrain and/or obstructions.	1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure ground and avoid steep hills or uneven terrain. 1a. If working near open water with an unguarded edge, wear life vest.
	1b. CONTACT: With traffic/third parties.	1b. Identify potential traffic sources and delineate work area with 42-inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.
	1c. EXERTION: Muscle strain from lifting equipment	1c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier. 4c. Make multiple trips to carry equipment.
	1d. EXPOSURE: To biological hazards.	1d. Inspect work area for bees and insects. 1d. Use insect/tick repellent as necessary.
2. Open/close well.	**2a. EXERTION:** Muscle strain.	2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well.
	2b. CAUGHT: Pinch/crush points associated with removing/replacing manholes and working with hand tools.	2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar or magnet for well cover) and inspect before use. 2b. Do not put fingers under well cover.
	2c. CAUGHT: Pinch points associated with placing J-plug back onto PVC pipe.	2c. See 2b. 2c. Keep fingers out of line-of-fire when securing cap.
	2d. EXPOSURE: To potential hazardous vapors.	2d. No open flames/heat sources. 2d. To minimize exposure to vapors, allow well to vent after opening it and before sampling activities begin. 2d. Stand up-wind if possible, to avoid inhaling vapors.
3. Gauge well.	**3a. CONTACT:** With contamination (e.g. contaminated groundwater).	3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe.
	3b. CONTACT: With traffic.	3b. See 1b.
	3c. Exposure: To static electricity, fire or explosion.	3c. Ground interface probe to a designated grounding point/rod, well casing or suitably electrically conductive surface to dissipate static electricity.

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

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[3] 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-015	DATE: 4/10/2023	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)	
GENERIC	**Site Recon**	**Mobilization/Demobilization**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Tim Unalp	SHSO	Brian Hobbs	CHSD

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION (as needed) ☒ SAFETY SHOES: Steel Toe or composite toe	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest of high-visibility clothing; long sleeve shirt; long pants	☒ GLOVES: Leather, nitrile, and cut resistant (as needed) ☐ OTHER

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Varies

COMMITMENT TO SAFETY- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

EXCLUSION ZONE (EZ): 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.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilize/demobilize and establish work area	**1a. FALL:** Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.	1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle. 1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways. Walk on stable/secure ground. 1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping; organize and store equipment neatly in one area at its lowest potential energy. 1a. Wear boots with adequate treads. 1a. Delineate unsafe areas with 42” cones, caution tape and/or flagging.
	1b. CONTACT: Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.	1b. Observe and maintain the posted speed limits. 1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers. 1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities and to discuss any special hazards. Ensure that short-service employees (SSE) are identified. 1b. Identify potential traffic sources. 1b. Wear PPE including high visibility clothing or reflective vest. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing whenever possible. 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. 1b. Delineate work area with 42” cones, flags, caution tape, and/or other barriers. 1b. Position “Work Area” signs at Site entrances, if possible, or at either side of work area.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
		1b. Position largest vehicle to protect against oncoming traffic. 1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route. 1b. Observe potential overhead and ground surface features that may interfere with moving equipment. Clear the path of physical hazards prior to initiating mobilization.
	1c. CAUGHT: Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.	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. 1c. Wear leather gloves when handling any tools or equipment. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools/glass. 1c. Keep body parts away from line-of-fire of equipment. 1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure. 1c. Remove any loose jewelry. Avoid wearing loose clothing and/or ensure loose clothing is secure. 1c. Secure all items on the equipment, tighten up any items or features that have potential to shift or break during mobilization.
	1d. OVEREXERTION: Muscle strains while lifting/carrying equipment.	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. 1d. Ensure that loads are balanced. Use assistance (mechanical or additional person) to carry equipment that is either unwieldy or over 50 lbs.
	1e. EXPOSURE: Personal injury from exposure to biological and environmental hazards.	1e. Inspect area to avoid contact with biological hazards (i.e. poisonous plants, stinging insects, ticks, etc.). 1e. Wear long sleeved clothes treated with Permethrin, apply insect repellant containing DEET to exposed skin, and inspect clothes and skin for ticks during and after work. 1e. Apply sunscreen (SPF 15+) if exposure to sun for 30 minutes or more is expected.
	1f. EXPOSURE: Weather related injuries.	1f. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, nausea, rapid and shallow breathing). Take breaks in cool places and hydrate as needed. 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. 1f. Wear clothing appropriate for weather and temperature conditions (e.g., rain jackets, snow pants, multiple layers). 1f. If lightning is observed, wait 30 minutes in a sheltered location (car is acceptable) before resuming work.
	1g. EXPOSURE: Personal injury from noise hazards.	1g. Wear hearing protection if sound levels exceed 85 dBA (if you must raise your voice for normal conversation).

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JOB SAFETY ANALYSIS	Ctrl. No. GEN-019	DATE: 4/10/2023	☐NEW ☒REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
GENERIC	**Site Reconnaissance**	**Site Walk and Inspection**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Sara Barrientos	Project Geologist	Brian Hobbs	Corporate Health and Safety Director
Tim Unalp	SHSO	Joe Duminuco	Executive Vice President

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: ear plugs as necessary ☒ SAFETY SHOES: Steel or composite toed	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: High-visibility vest or high-vis outerwear	☒ GLOVES: Leather/cut-resistant/chemical resistant ☒ OTHER: Tyvek and rubber boots as necessary, dust mask as necessary

REQUIRED AND / OR RECOMMENDED EQUIPMENT

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, and bug spray.

Commitment to Safety – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

EXCLUSION ZONE (EZ): 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.

SITE SECURITY: 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.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Check in with Site contact.	**1a. CONTACT/EXPOSURE/FALL:** Personal injury caused by lack of awareness 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. CONTACT:** Property damage and personal injury caused by obstructions/vehicles or unauthorized personnel at remote Sites. **2b. FALL:** Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone. **2c. OVEREXERTION:** Muscle strain while carrying equipment. **2d. EXPOSURE:** Biological hazards – ticks; bees/wasps; poison ivy; insects; (Ticks are most active any time the temperature is above freezing, typically from March to November.)	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. 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. 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 the buddy system or mechanical means to maneuver items heavier than 50-lb. If necessary, make multiple trips to carry equipment. 2d. Inspect area to avoid contact with biological hazards. 2d. Ticks: • Treat outer clothing including pants, shirts, socks, boots and hats the evening before with Permethrin (allowing at least two hours before use). • Apply DEET to exposed skin before travelling to the Site and reapply after two hours. • Check for ticks during and after work. 2d. Bees: • Use bee spray as appropriate to deter/eliminate bees.

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	2e. EXPOSURE: Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	• Protect exposed skin with insect repellent. 2d. Poison Ivy: • Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas. • If skin contacts poison ivy, wash skin thoroughly with soap and water. 2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected. 2e. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 2e. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 2e. Wear appropriate rain gear as needed. 2e. Take frequent breaks if tired, wet, or cold/hot. Drink water. 2e. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
3. Walking near heavy equipment and machinery.	**3a. CONTACT:** Personal injury from Site and roadway traffic. Personal injury from flying debris **3b. OVEREXERTION:** Personal injury from lifting/moving/rotating equipment. **3c. EXPOSURE:** Hearing damage from noise generating equipment/processes. Inhalation/exposure to hazardous vapors and or dust. **3d. EXPOSURE:** Working in a remote area.	3a. See 2a. 3a. Maintain an exclusion zone of at least 10'-25' feet from all engaged equipment. 3a. Keep body parts out of the line-of-fire of pinch points. 3a. Wear appropriate PPE always. 3b. See 2c. 3c. Wear hearing protection if >85 dBA. (i.e. noise levels which require you to raise your voice to communicate) 3c. Always wear leather gloves when handling any tools or equipment. 3c. Always wear appropriate PPE based off chemicals present. 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. 3d. Always carry a communication device (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) when traversing remote areas. 3d. If available, follow Lone Worker Protocol/Procedure.
4. Working in adverse weather conditions.	**4a. EXPOSURE:** Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	4a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 4a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 4a. Wear appropriate rain gear as needed. 4a. Take frequent breaks if tired, wet, or cold/hot. Drink water. 4a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
5. Departing Site.	**5a. EXPOSURE:** Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search.	5a. Sign out or notify Site contact and Roux Project Manager of your departure.

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JOB SAFETY ANALYSIS	Ctrl. No. GEN-023	DATE: 04/11/2023	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)	
Generic	**Construction**	**Spotting Heavy Machinery**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Levi Curnutte	Senior Scientist	Brian Hobbs	CHSD
Tim Unalp	SHSO		

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ Particulate Respirator	☒ GLOVES: Cut resistant / leather
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER:
☒ LONG SLEEVED SHIRT	☐ HEARING PROTECTION	☒ PPE CLOTHING: Fluorescent reflective clothing	
☐ LIFELINE / BODY HARNESS	☒ SAFETY SHOES: Steel-/Composite-toe boots/shoes		
☒ SAFETY GLASSES			

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Heavy Machinery (i.e. excavator, payloader, truck, forklift, etc.), two-way radios.

COMMITMENT TO SAFETY- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs

EXCLUSION ZONE (EZ): 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.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Prepare for machine activity.	**1a. CONTACT:** Obstructions in the work area may create contact hazards from machinery. **1b. Fall :** 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 **EZ.** 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.	**2a. CONTACT:** 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. **(This includes the spotter unless an exception has been established in the Site-specific JSA).** 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. **No heavy equipment shall operate without a spotter under any circumstances.** 2a. Wear fluorescent clothing/safety vest. 2a. **Do not multitask. Only perform Spotting**

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
	2b. FALL: Slip/Trip/Fall	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. 2b. **Do not walk backwards. Always face the direction you are walking towards.**
	2c. CAUGHT: Caught between machinery and nearby objects.	2c. **Maintain Exclusion Zone.** 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.
	2d. EXPOSURE: Inhalation of exhaust from machinery.	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.

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JOB SAFETY ANALYSIS	Ctrl. No. GEN-029	DATE: 4/11/2023	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)	
GENERIC	**Preclearing/Sampling**	**Hand Augering**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Sean Owens	Senior Health & Safety Specialist	Brian Hobbs	Corporate Health & Safety Director

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES: Cut Resistant / Leather / Nitrile / Chemical resistant
☒ HARD HAT	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☐ OTHER
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING: Long sleeve high visibility clothing	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Steel or composite toed		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Hand Auger Tools (buckets, rods), 5-gallon buckets, hand tools (hammer, etc)

COMMITMENT TO SAFETY- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing SPSAs.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Drive/walk to hand clearing/hand augering location	**1a. CONTACT:** Property damage and personal injury caused by obstructions/vehicles	1a. Maintain speed limit on-site. 1a. All equipment must be stowed and secured prior to moving. 1a. Drive on established roadways. 1a. Do not back up vehicle without spotter where visibility is limited; use pull-through spots or back into parking spots; use an audible signal (horn/back-up alarm) when backing up vehicles.1c.
	1b. FALL: Personal injury from tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at portions of the Site	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. Use established pathways and walk on stable, secure ground. 1b. Use established ramp when descending into/ascending from impoundment areas. 1b. Keep tools and equipment in a designated area. When not in use, tools and equipment must be returned to their proper storage location. Keep work area clear of obstructions.
	1c. EXERTION: Muscle strain/exhaustion while carrying equipment (i.e., hand auger, post-hole digger, shovel, pry bar)	1c. 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.
	1d. EXPOSURE: Exposure to sun, possibly causing sunburn Biological hazards - bees/wasps, poison oak, thorns, insects, etc.	1d. Wear sunscreen with an SPF of at least 15 whenever 30 minutes or more of exposure is expected. 1d. Inspect area to avoid contact with biological hazards. 1d. Wear cut resistant gloves when handling branches, shrubs, etc. that may lie within the walking path. 1d. Avoid any areas onsite that have poison oak.
2. Secure location	**2a. CONTACT:** Personnel and vehicular traffic may enter the work area.	2a. Delineate the work area with traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity. 2a. Wear reflective vest and/or fluorescent clothing. 2a. Face the direction of vehicular traffic. Position vehicle to protect worker from traffic. 2a. Communicate work activity with adjacent work areas.
	2b. FALL: Tripping/falling due to uneven terrain, and materials /equipment stored within the work area	2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment to the impoundments. 2b. Equipment and tools will be staged in a convenient, stable, and orderly manner. 2b. 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). 2b. Equipment and tools that are not anticipated to be used will be returned to an appropriate storage area that is out of the immediate work area.

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
[2] 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.
[3] 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
3. Verify pre-clearance protocol; review completed Subsurface Utility Checklist and utility verification site walkthrough.	**3a. ENERGY SOURCE:** Underground utility damage; property damage; personal injury	3a. Confirm that "Call Before You Dig" and local utility companies were contacted prior to hand augering. 3a. Walk the Site to evaluate utility markings and review maps.
4. Augering/advancing borehole	**4a. EXPOSURE:** Contaminated soil/water/vapor **4b. EXERTION:** Muscle strain from lifting, bending, repetitive motion. **4c. CAUGHT:** Personal injury as a result of jewelry/loose clothing caught on equipment, well covers, machinery, hand auger, pry bar etc.. **4d. CONTACT/CAUGHT:** Pinch points, abrasions	4a. Monitor breathing zone with a PID when VOCs area concern. If vapors sustain > 5 ppm, upgrade PPE as per HASP. 4a. Wear chemical-resistant disposable gloves and safety glasses when handling impacted materials. 4a. Place excavated soil on plastic sheeting and store soil waste in designated area. 4a. Work on the upwind side of the boring. 4b. Body positioning and rotating with the auger to reduce strain. Don't twist back. 4c. No form of jewelry should be worn while on-site. 4c. Clothing must be appropriately sized so it is not loose fitting. 4d. Keep head and upper body clear when lifting hand auger, pry bar/post-hole digger. Ensure to not be overly aggressive when using pry bar. 4d. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.
5. Lithologic observation and soil sampling	**5a. EXPOSURE:** Contact with contamination (impacted soil and/or lab preservatives)	5a. Wear chemical-resistant disposable gloves to protect hands when handling samples; wear safety glasses when handling any preservatives; use containment material or plastic sheeting to protect surrounding areas. 5a. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground. 5a. Open sample jars slowly and fill carefully to avoid contact with preservatives.
6. Decontaminate equipment	**6a. EXPOSURE:** Contact with contamination (impacted soil and/or lab preservatives, decontamination solution) **6b. CONTACT/CAUGHT:** pinch points and cuts/abrasions	6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. Use an absorbent pad to clean spills. 6a. Properly dispose of used materials/PPE trash bags. 6b. Keep fingers/hands out of pinch points when dis-assembling hand auger during decontamination.

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
[2] 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.
[3] 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 B

SDSs for Chemicals Used

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Alconox
Synonyms:
Product number: Alconox

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer
Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040

Supplier
Not Applicable

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Skin irritation, category 2.
Eye irritation, category 2A.

Hazard pictograms:

Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

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.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Additional information: None.

Hazard description

Hazards Not Otherwise Classified (HNOC): None

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. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, 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 : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

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.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

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.

5 Firefighting measures

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 :

Avoid breathing mist or vapor.
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.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

8 Exposure controls/personal protection

8.1 Control parameters :

7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3.

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 conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

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

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	**Explosion limit lower:** **Explosion limit upper:**	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or not available.
pH-value:	9.5 (aqueous solution)	**Relative density:**	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities:**	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water):**	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature:**	Not determined or not available.
Evaporation rate:	Not determined or not available.	**Decomposition temperature:**	Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Flammability (solid, gaseous):	Not determined or not available.	**Viscosity**:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

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 irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

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.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 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

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class: None
Label: None
LTD. QTY: None

US DOT
Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Comments: None	**Comments:** None
14.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
14.5 Environmental hazards :	None
14.6 Special precautions for user:	None
Danger code (Kemler):	None
EMS number:	None
Segregation groups:	None

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.

14.8 Transport/Additional information:

Transport category:	None
Tunnel restriction code:	None
UN "Model Regulation":	None

15 Regulatory information

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

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Germany MAK: Not classified.

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.
H319 Causes serious eye irritation.

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.

NFPA: 1-0-0

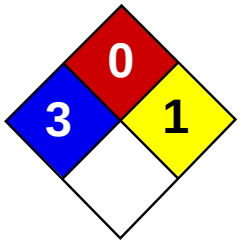
Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

HMIS: 1-0-0



Material Safety Data Sheet
Hydrochloric acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hydrochloric acid

Catalog Codes: SLH1462, SLH3154

CAS#: Mixture.

RTECS: MW4025000

TSCA: TSCA 8(b) inventory: Hydrochloric acid

CI#: Not applicable.

Synonym: Hydrochloric Acid; Muriatic Acid

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Hydrogen chloride	7647-01-0	20-38
Water	7732-18-5	62-80

Toxicological Data on Ingredients: Hydrogen chloride: GAS (LC50): Acute: 4701 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth. Repeated or prolonged exposure to the substance can produce target

organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

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

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

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

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

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

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of metals

Explosion Hazards in Presence of Various Substances: Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Non combustible. Calcium carbide reacts with hydrogen chloride gas with incandescence. Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine. Rubidium acetylene carbides burns with slightly warm hydrochloric acid. Lithium silicide in contact with hydrogen chloride becomes incandescent. When dilute hydrochloric acid is used, gas spontaneously flammable in air is evolved. Magnesium boride treated with concentrated hydrochloric acid produces spontaneously flammble gas. Cesium acetylene carbide burns hydrogen chloride gas. Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute. Reacts with most metals to produce flammable Hydrodgen gas.

Special Remarks on Explosion Hazards:

Hydrogen chloride in contact with the following can cause an explosion, ignition on contact, or other violent/vigorous reaction: Acetic anhydride AgClO + CCl4 Alcohols + hydrogen cyanide, Aluminum Aluminum-titanium alloys (with HCl vapor), 2-Amino ethanol, Ammonium hydroxide, Calcium carbide Ca3P2 Chlorine + dinitroanilines (evolves gas), Chlorosulfonic acid Cesium carbide Cesium acetylene carbide, 1,1-Difluoroethylene Ethylene diamine Ethylene imine, Fluorine, HClO4 Hexalithium disilicide H2SO4 Metal acetylides or carbides, Magnesium boride, Mercuric sulfate, Oleum, Potassium permanganate, beta-Propiolactone Propylene oxide Rubidium carbide, Rubidium, acetylene carbide Sodium (with aqueous HCl), Sodium hydroxide Sodium tetraselenium, Sulfonic acid, Tetraselenium tetranitride, U3P4 , Vinyl acetate. Silver perchlorate with carbon tetrachloride in the presence of hydrochloric acid produces trichloromethyl perchlorate which detonates at 40 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

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

Section 8: Exposure Controls/Personal Protection

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

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

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

Exposure Limits:
CEIL: 5 (ppm) from OSHA (PEL) [United States] CEIL: 7 (mg/m3) from OSHA (PEL) [United States] CEIL: 5 from NIOSH CEIL: 7 (mg/m3) from NIOSH TWA: 1 STEL: 5 (ppm) [United Kingdom (UK)] TWA: 2 STEL: 8 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pungent. Irritating (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Acidic.

Boiling Point:
108.58 C @ 760 mm Hg (for 20.22% HCl in water) 83 C @ 760 mm Hg (for 31% HCl in water) 50.5 C (for 37% HCl in water)

Melting Point:
-62.25°C (-80°F) (20.69% HCl in water) -46.2 C (31.24% HCl in water) -25.4 C (39.17% HCl in water)

Critical Temperature: Not available.

Specific Gravity:
1.1- 1.19 (Water = 1) 1.10 (20%and 22% HCl solutions) 1.12 (24% HCl solution) 1.15 (29.57% HCl solution) 1.16 (32% HCl solution) 1.19 (37% and 38%HCl solutions)

Vapor Pressure: 16 kPa (@ 20°C) average

Vapor Density: 1.267 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.25 to 10 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Soluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, water

Incompatibility with various substances:
Highly reactive with metals. Reactive with oxidizing agents, organic materials, alkalis, water.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper, of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Reacts with water especially when water is added to the product. Absorption of gaseous hydrogen chloride on mercuric sulfate becomes violent @ 125 deg. C. Sodium reacts very violently with gaseous hydrogen chloride. Calcium phosphide and hydrochloric acid undergo very energetic reaction. It reacts with oxidizers releasing chlorine gas. Incompatible with, alkali metals, carbides, borides, metal oxides, vinyl acetate, acetylides, sulphides, phosphides, cyanides, carbonates. Reacts with most metals to produce flammable Hydrogen gas. Reacts violently (moderate reaction with heat of evolution) with water especially when water is added to the product. Isolate hydrogen chloride from heat, direct sunlight, alkalies (reacts vigorously), organic materials, and oxidizers (especially nitric acid and chlorates), amines, metals, copper and alloys (e.g. brass), hydroxides, zinc (galvanized materials), lithium silicide (incandescence), sulfuric acid(increase in temperature and pressure) Hydrogen chloride gas is emitted when this product is in contact with sulfuric acid. Adsorption of Hydrochloric Acid onto silicon dioxide results in exothmeric reaction. Hydrogen chloride causes aldehydes and epoxides to violently polymerize. Hydrogen chloride or Hydrochloric Acid in contact with the folloiwng can cause explosion or ignition on contact or

Special Remarks on Corrosivity:

Highly corrosive. Incompatible with copper and copper alloys. It attacks nearly all metals (mercury, gold, platinium, tantalum, silver, and certain alloys are exceptions). It is one of the most corrosive of the nonoxidizing acids in contact with copper alloys. No corrosivity data on zinc, steel. Severe Corrosive effect on brass and bronze

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:
Acute oral toxicity (LD50): 900 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 1108 ppm, 1 hours [Mouse]. Acute toxicity of the vapor (LC50): 3124 ppm, 1 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. May cause damage to the following organs: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth.

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

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Doses (LDL/LCL) LDL [Man] -Route: Oral; 2857 ug/kg LCL [Human] - Route: Inhalation; Dose: 1300 ppm/30M LCL [Rabbit] - Route: Inhalation; Dose: 4413 ppm/30M

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (fetoxicity). May affect genetic material.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Corrosive. Causes severe skin irritation and burns. Eyes: Corrosive. Causes severe eye irritation/conjuntivitis, burns, corneal necrosis. Inhalation: May be fatal if inhaled. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation of hydrochloric acid fumes produces nose, throat, and larryngeal burning, and irritation, pain and inflammation, coughing, sneezing, choking sensation, hoarseness, laryngeal spasms, upper respiratory tract edema, chest pains, as well has headache, and palpitations. Inhalation of high concentrations can result in corrosive burns, necrosis of bronchial epithelium, constriction of the larynx and bronchi, nasospetal perforation, glottal closure, occur, particularly if exposure is prolonged. May affect the liver. Ingestion: May be fatal if swallowed. Causes irritation and burning, ulceration, or perforation of the gastrointestinal tract and resultant peritonitis, gastric hemorrhage and infection. Can also cause nausea, vomitting (with "coffee ground" emesis), diarrhea, thirst, difficulty swallowing, salivation, chills, fever, uneasiness, shock, strictures and stenosis (esophogeal, gastric, pyloric). May affect behavior (excitement), the cardiovascular system (weak rapid pulse, tachycardia), respiration (shallow respiration), and urinary system (kidneys- renal failure, nephritis). Acute exposure via inhalation or ingestion can also cause erosion of tooth enamel. Chronic Potential Health Effects: dyspnea, bronchitis. Chemical pneumonitis and pulmonary edema can also

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Hydrochloric acid, solution UNNA: 1789 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Hydrochloric acid Illinois toxic substances disclosure to employee act: Hydrochloric acid Illinois chemical safety act: Hydrochloric acid New York release reporting list: Hydrochloric acid Rhode Island RTK hazardous substances: Hydrochloric acid Pennsylvania RTK: Hydrochloric acid Minnesota: Hydrochloric acid Massachusetts RTK: Hydrochloric acid Massachusetts spill list: Hydrochloric acid New Jersey: Hydrochloric acid New Jersey spill list: Hydrochloric acid Louisiana RTK reporting list: Hydrochloric acid Louisiana spill reporting: Hydrochloric acid California Director's List of Hazardous Substances: Hydrochloric acid TSCA 8(b) inventory: Hydrochloric acid TSCA 4(a) proposed test rules: Hydrochloric acid SARA 302/304/311/312 extremely hazardous substances: Hydrochloric acid SARA 313 toxic chemical notification and release reporting: Hydrochloric acid CERCLA: Hazardous substances.: Hydrochloric acid: 5000 lbs. (2268 kg)

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

Other Classifications:

WHMIS (Canada):
CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R34- Causes burns. R37- Irritating to respiratory system. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 1

Personal Protection:

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

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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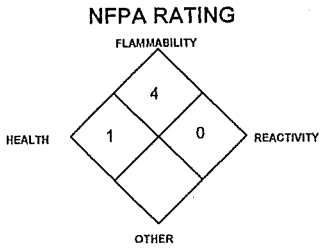
Last Updated: 05/21/2013 12:00 PM

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards



PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS:	**ISOBUTYLENE - C_4H_8** Document Number: Isobutylene
PRODUCT USE:	For general analytical/synthetic chemical uses.
SUPPLIER/MANUFACTURER'S NAME: ADDRESS:	MESA Specialty Gases & Equipment 3619 Pendleton Avenue, Suite C Santa Ana, CA 92704
BUSINESS PHONE: EMERGENCY PHONE:	1-714-434-7102 INFOTRAC: 1-800-535-5053
DATE OF PREPARATION:	May 10, 1999

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	OTHER
Isobutylene	115-11-7	> 99.0%	There are no specific exposure limits for Isobutylene. Isobutylene is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					
Maximum Impurities		< 1.0%	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.					

NE = Not Established C = Ceiling Limit See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Isobutylene is a colorless, liquefied, flammable gas with an unpleasant odor similar to burning coal. The liquefied gas rapidly turns into a gas at standard atmospheric temperatures and pressures. Isobutylene is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Rapid evaporation of liquid from the cylinder may cause frostbite. Both the liquid and gas pose a serious fire hazard when accidentally released. The gas is heavier than air and may travel to a source of ignition and flash back to a leak or open container. Flame or high temperature impinging on a localized area of a cylinder of Isobutylene can cause the cylinder to rupture without activating the cylinder's relief devices. Provide adequate fire protection during emergency response situations.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant route of overexposure for this gas is by inhalation. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of overexposure, death may occur. Isobutylene also has some degree of anesthetic action and can be mildly irritating to the mucous membranes. The effects associated with various levels of oxygen are as follows:

CONCENTRATION	SYMPTOMS OF EXPOSURE
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	4
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For routine industrial applications

See Section 16 for Definition of Ratings

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Overexposure to Isobutylene may cause the following health effects:

ACUTE: The most significant hazard associated with this gas is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, headache, dizziness, and nausea. At high concentrations, unconsciousness or death may occur. Contact with liquefied gas or rapidly expanding gases may cause frostbite.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to Isobutylene.

TARGET ORGANS: Respiratory system.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO ISOBUTYLENE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations.

4. FIRST-AID MEASURES (Continued)

Remove victim(s) to fresh air as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Only trained personnel should administer supplemental oxygen.

In case of frostbite, place the frostbitten part in warm water. DO NOT USE HOT WATER. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

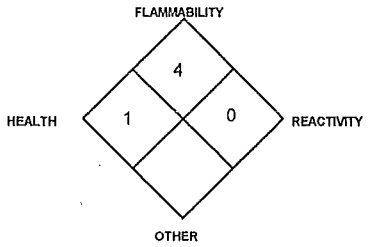
Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT (Closed Cup): -10°C (< 14°F)
AUTOIGNITION TEMPERATURE: 465°C (869°F)
FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 1.8%
Upper (UEL): 9.6%

NFPA RATING



See Section 16 for Definition of Ratings

FIRE EXTINGUISHING MATERIALS: Extinguish Isobutylene fires by shutting off the source of the gas. Use water spray or a foam agent to cool fire-exposed containers, structures, and equipment.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may ignite and produce toxic gases, including carbon monoxide and carbon dioxide.

DANGER! Fires impinging (direct flame) on the outside surface of unprotected pressure storage vessels of Isobutylene can be very dangerous. Direct flame exposure on the cylinder wall can cause an explosion either by BLEVE (Boiling Liquid Expanding Vapor Explosion), or by exothermic decomposition. This is a catastrophic failure of the vessel releasing the contents into a massive fireball and explosion. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the vessel. For massive fires in large areas, use unmanned hose holder or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Static discharge may cause Isobutylene to ignite explosively if released.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder, tank car, or pipeline. Stop the leak before extinguishing fire. If the fire is extinguished before the leak is sealed, the leaking gas could explosively re-ignite without warning and cause extensive damage, injury, or fatality. In this case, increase ventilation (in enclosed areas) to prevent flammable or explosive mixture formation. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of vessel exposures, evacuate the area. Refer to the North American Emergency Response Guidebook for additional information. Other information for pre-planning can be found in the American Petroleum Institute Publications 2510 and 2510A.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area, protect people, and respond with trained personnel. Adequate fire protection must be provided. Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, gloves resistant to tears, and Self-Contained Breathing Apparatus.**

Use only non-sparking tools and equipment. Locate and seal the source of the leaking gas. Protect personnel attempting the shut off with water spray. Allow the gas to dissipate. Monitor the surrounding area for combustible gas levels and oxygen. Combustible gas concentration must be below 10% of the LEL (LEL = 1.8%) prior to entry. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in place or remove it to a safe area and allow the gas to be released there.

THIS IS AN EXTREMELY FLAMMABLE GAS. Protection of all personnel and the area must be maintained.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Isobutylene IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Isobutylene could occur without any significant warning symptoms.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits. Post "No Smoking or Open Flames" signs in storage or use areas.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Isolate from oxidizers such as oxygen, chlorine, or fluorine. Use a check valve or trap in the discharge line to prevent hazardous backflow. Post "No Smoking or Open Flame" signs in storage and use areas. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand truck. Do not drag, slide, or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap, if provided, in place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Isobutylene. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "*Oxygen Deficient Atmospheres*".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g., nitrogen) before attempting repairs.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents Isobutylene dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the presence of potentially explosive air-gas mixtures and level of oxygen.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Maintain level of gas below the level listed in Section 2 (Composition and Information on Ingredients). Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of Isobutylene. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

EYE PROTECTION: Splash goggles or safety glasses, for protection from rapidly expanding gases and splashes of liquid Isobutylene.

HAND PROTECTION: Wear gloves resistant to tears when handling cylinders of Isobutylene. Use low-temperature protective gloves (e.g., Kevlar) when working with containers of liquid Isobutylene.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from splashes of liquefied product, as well as fire retardant items.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY @ 21.1°C (70°F): 2.396 kg/m^3 (0.1496 lb/ft^3)
SPECIFIC GRAVITY (air = 1): 1.997
SOLUBILITY IN WATER: Insoluble.
EVAPORATION RATE (nBuAc = 1): Not applicable.
ODOR THRESHOLD: Not established.
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.
pH: Not applicable.
FREEZING POINT: -140°C (-220.6°F)
BOILING POINT @ 1 atm: -6.9°C (19.6°F)
EXPANSION RATIO: Not applicable
VAPOR PRESSURE (psia): 39
SPECIFIC VOLUME (ft^3/lb): 6.7

APPEARANCE AND COLOR: Colorless gas with the unpleasant odor of burning coal. The liquid is also colorless and has the same unpleasant odor of burning coal.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: When ignited in the presence of oxygen, this gas will burn to produce carbon monoxide and carbon dioxide.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers (e.g., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride).

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks, and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is for pure Isobutylene.

ISOBUTYLENE:
LC_{50} (rat, inhalation) = 620 g/m^3/4 hours
LC_{50} (mouse, inhalation) = 415 g/m^3/2 hours

SUSPECTED CANCER AGENT: Isobutylene is not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, and therefore is neither considered to be nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Isobutylene may be mildly irritating to the mucous membranes. In addition, contact with rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Isobutylene is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Isobutylene on the human reproductive system.

Mutagenicity: No mutagenic effects have been described for Isobutylene.
Embryotoxicity: No embryotoxic effects have been described for Isobutylene.
Teratogenicity: No teratogenic effects have been described for Isobutylene.
Reproductive Toxicity: No reproductive toxicity effects have been described for Isobutylene.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e., within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by overexposure to Isobutylene.

11. TOXICOLOGICAL INFORMATION (Continued)

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Isobutylene.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen-deficient environments. No adverse effect is anticipated to occur to plant life, except for frost produced in the presence of rapidly expanding gases. See Section 11, Toxicological Information, for additional information on effects on animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on the effects of Isobutylene on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to MESA Specialty Gases & Equipment Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

For Isobutylene Gas:

PROPER SHIPPING NAME:	Isobutylene
HAZARD CLASS NUMBER and DESCRIPTION:	2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER:	UN 1055
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

Alternate Description:

PROPER SHIPPING NAME:	Petroleum gases, liquefied
HAZARD CLASS NUMBER and DESCRIPTION:	2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER:	UN 1075
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

MARINE POLLUTANT: Isobutylene is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Isobutylene is not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

CANADIAN DSL/NDSL INVENTORY STATUS: Isobutylene is on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Isobutylene is listed on the TSCA Inventory.

15. REGULATORY INFORMATION (Continued)

OTHER U.S. FEDERAL REGULATIONS: Isobutylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 lb. Depending on specific operations involving the use of Isobutylene, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Isobutylene is not listed in Appendix A; however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lb (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

U.S. STATE REGULATORY INFORMATION: Isobutylene is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Liquefied Petroleum Gas.
California - Permissible Exposure Limits for Chemical Contaminants: Liquefied Petroleum Gas.
Florida - Substance List: Isobutylene.
Illinois - Toxic Substance List: No.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Isobutylene.
Michigan - Critical Materials Register: No.
Minnesota - List of Hazardous Substances: Liquefied Petroleum Gas.
Missouri - Employer Information/Toxic Substance List: No.
New Jersey - Right to Know Hazardous Substance List: Isobutylene.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Isobutylene.
Rhode Island - Hazardous Substance List: Liquefied Petroleum Gas.
Texas - Hazardous Substance List: Liquefied Petroleum Gas.
West Virginia - Hazardous Substance List: Liquefied Petroleum Gas.
Wisconsin - Toxic and Hazardous Substances: Liquefied Petroleum Gas.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Isobutylene is not on the California Proposition 65 lists.

LABELING:

DANGER:

FLAMMABLE LIQUID AND GAS UNDER PRESSURE.
CAN FORM EXPLOSIVE MIXTURES WITH AIR.
MAY CAUSE FROSTBITE.

Keep away from heat, flames, and sparks.
Store and use with adequate ventilation.
Cylinder temperature should not exceed 52°C (125°F).
Do not get liquid in eyes, on skin, or clothing.
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

FIRST AID:

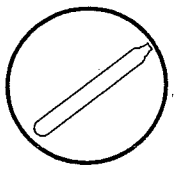
IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gas
Class B1: Flammable Gas



16. OTHER INFORMATION

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. MESA Specialty Gases & Equipment assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, MESA Specialty Gases & Equipment assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:
ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average **(TWA)**, the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level **(C)**. Skin absorption effects must also be considered.
OSHA - U.S. Occupational Safety and Health Administration. **PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.
IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration **(OSHA)**. NIOSH issues exposure guidelines called Recommended Exposure Levels **(RELs)**. When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:
HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).
NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury).

NATIONAL FIRE PROTECTION ASSOCIATION (Continued): Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:
Much of the information related to fire and explosion is derived from the National Fire Protection Association **(NFPA)**. Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:
Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo, LDLo**, and **LDo**, or **TC, TCo, LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information: EC is the effect concentration in water.

REGULATORY INFORMATION:
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act **(SARA)**; the Canadian Domestic/Non-Domestic Substances List **(DSL/NDSL)**; the U.S. Toxic Substance Control Act **(TSCA)**; Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act **(CERCLA or Superfund)**; and various state regulations.

Manufactured for

INDUSTRIAL SCIENTIFIC

CORPORATION

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TOLL-FREE 800-DETECTS
Fax (412) 788-8353

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE

Containing One or More of the Following Components in a Nitrogen Balance Gas: Oxygen, 0.0015-23.5%; Propane, 0-1.1%; n-Pentane, 0-0.75%; n-Hexane; 0-0.48%; Carbon Monoxide, 0.0005-1.0%; Hydrogen Sulfide, 0.001-0.025%

NOTE: MIXTURES COMPRISED OF AN AIR BALANCE GAS CONTAIN BETWEEN 19.5-23.5% OXYGEN.

SYNONYMS: Not Applicable

CHEMICAL FAMILY NAME: Not Applicable

FORMULA: Not Applicable

Document Number: 50016 (Replaces ISC MSDS No.1810-2187, 1810-2343, 1810-3366, 1810-3937 1810-7219, 1810-7599, 1810-6179)

Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE:	Calibration of Monitoring and Research Equipment
SUPPLIER/MANUFACTURER'S NAME:	CALGAZ
ADDRESS:	821 Chesapeake Drive Cambridge, MD 21613
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	1-410-228-6400
General MSDS Information	1-713/868-0440
Fax on Demand:	1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIHTLV		OSHA		IDLH	OTHER
			TWA ppm	STEL ppm	TWA ppm	STEL ppm	ppm	ppm
Oxygen	7782-44-7	0.0015 - 23.5%	There are no specific exposure limits for Oxygen. Oxygen levels should be maintained above 19.5%.					
Propane	74-98-6	0 - 1.1%	2500	NE	1000	NE	2100	NIOSH REL: 1000 DFG MAK: 1000 ppm
n-Pentane	109-66-0	0 - 0.75%	600	750	1000 600 (Vacated 1989 PEL)	750 (Vacated 1989 PEL)	1500	NIOSH REL: TWA = 120 STEL = 610 (ceiling) 15 minutes DFG MAKs: TWA =1000 PEAK = 2•MAK, 60 min., momentary value
n-Hexane	110-54-3	0 - 0.48%	50	NE	500 50 (Vacated 1989 PEL)	NE	1100	NIOSH REL: 50 DFG MAK: 50
Hydrogen Sulfide	7783-06-4	0.001-0.025 %	10 NIC = 5	15 NIC = 5	10 (Vacated 1989 PEL)	20 (ceiling), 50 (10 min. peak, once per shift) 15 (Vacated 1989 PEL)	100	NIOSH REL: STEL = 10 (ceiling), 10 minutes DFG MAKs: TWA = 10 PEAK = 2•MAK, 10 min., momentary value
Carbon Monoxide	630-08-0	0.0005 - 1.0%	25	NE	50 35 (Vacated 1989 PEL)	200 (ceiling) (Vacated 1989 PEL)	1200	NIOSH RELs: TWA = 35 STEL = 200 ceiling DFG MAKs: TWA = 30 PEAK = 2•MAK, 15 min., average value, 1 hr interval DFG MAK Pregnancy Risk Classification: B
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established. NIC = Notice of Intended Change See Section 16 for Definitions of Terms Used.

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas mixture has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This gas mixture is a colorless gas which has a rotten-egg odor (due to the presence of Hydrogen Sulfide). The odor cannot be relied on as an adequate warning of the presence of this gas mixture, because olfactory fatigue occurs after over-exposure to Hydrogen Sulfide. Hydrogen Sulfide and Carbon Monoxide (another component of this gas mixture) are toxic to humans in relatively low concentrations. Over-exposure to this gas mixture can cause skin or eye irritation, nausea, dizziness, headaches, collapse, unconsciousness, coma, and death. The Propane, n-Pentane, and n-Hexane components can cause anesthetic or peripheral neuropathy effects. Additionally, releases of this gas mixture may produce oxygen-deficient atmospheres (especially in small confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas mixture is by inhalation.

INHALATION: Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. A significant health hazard associated with this gas mixture is the potential of inhalation of Hydrogen Sulfide, a component of this gas mixture. Such over-exposures may occur if this gas mixture is used in a confined space or other poorly-ventilated area. Over-exposures to Hydrogen Sulfide can cause dizziness, headache, and nausea. Exposure to this component can result in respiratory arrest, coma, or unconsciousness. Continuous inhalation of low concentrations of Hydrogen Sulfide may cause olfactory fatigue, so that the odor is no longer an effective warning of the presence of this gas. A summary of exposure concentrations and observed effects are as follows

CONCENTRATION OF HYDROGEN SULFIDE	OBSERVED EFFECT
0.3-30 ppm	Odor is obvious and unpleasant.
50 ppm	Eye irritation. Dryness and irritation of nose, throat.
Slightly higher than 50 ppm	Irritation of the respiratory system.
100-150 ppm	Temporary loss of smell.
200-250 ppm	Headache, vomiting nausea. Prolonged exposure may lead to lung damage. Exposures of 4-8 hours can be fatal.
300-500	Swifter onset of symptoms. Death occurs in 1-4 hours.
500 ppm	Headache, excitement, staggering, and stomach ache after brief exposure. Death occurs within 0.5 - 1 hour of exposure.
> 600 ppm	Rapid onset of unconsciousness, coma, death.
> 1000 ppm	Immediate respiratory arrest.
NOTE:	This gas mixture contains a maximum of 250 ppm Hydrogen Sulfide. The higher concentration values here are presented to delineate the complete health effects which have been observed for humans after exposure to Hydrogen Sulfide.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	3
FLAMMABILITY HAZARD	(RED)	0
PHYSICAL HAZARD	(YELLOW)	0

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
See Section 8			

For Routine Industrial Use and Handling Applications

Inhalation over-exposures to atmospheres containing more than the Threshold Limit Value of Carbon Monoxide (25 ppm), another component of this gas mixture, can result in serious health consequences. Carbon Monoxide is classified as a chemical asphyxiant, producing a toxic action by combining with the hemoglobin of the blood and replacing the available oxygen. Through this replacement, the body is deprived of the required oxygen, and asphyxiation occurs.

Since the affinity of Carbon Monoxide for hemoglobin is about 200-300 times that of oxygen, only a small amount of Carbon Monoxide will cause a toxic reaction to occur. Carbon Monoxide exposures in excess of 50 ppm will produce symptoms of poisoning if breathed for a sufficiently long time. If this gas mixture is released in a small, poorly ventilated area (i.e. an enclosed or confined space), symptoms which may develop include the following:

CONCENTRATION OF CARBON MONOXIDE	OBSERVED EFFECT
All exposure levels: ..	Over-exposure to Carbon Monoxide can be indicated by the lips and fingernails turning bright red.
200 ppm:	Slight symptoms (i.e. headache) after several hours of exposure.
400 ppm:	Headache and discomfort experienced within 2-3 hours of exposure.
1,000 -2000 ppm:	Within 30 minutes, slight palpitations of the heart occurs. Within 1.5 hours, there is a tendency to stagger.
200-2500 ppm:	Within 2 hours, there is mental confusion, headaches, and nausea. Unconsciousness within 30 minutes.
> 2500 ppm:	Potential for collapse and death before warning symptoms.

Another hazard associated with this gas mixture is the potential for anesthetic and peripheral neuropathy effects after inhalation over-exposures to the Propane, n-Pentane and n-Hexane components of this gas mixture. Specific human over-exposure data are available for n-Pentane and n-Hexane, as follows:

CONCENTRATION OF n-PENTANE	OBSERVED EFFECT
Brief (10 minute) up to 5,000 ppm:	No symptoms.
Higher than 5,000 ppm:	Exhilaration, dizziness and headache can occur.
Long term:	Can cause chronic neurological disorder causing damage to the nerves in the hands and feet (peripheral neuropathy)

CONCENTRATION OF n-HEXANE	OBSERVED EFFECT
Brief (10 minute) at 1,500 ppm:	Irritation of the respiratory tract, nausea and headache.
5000 ppm:	Dizziness and drowsiness can occur.
Long term at 500 ppm:	Can affect the nerves in the arms and legs. Effects include numbing or tingling sensations in the fingers and toes, tiredness, muscle weakness, cramps and spasms in the leg, difficulty in holding objects or walking, abdominal pains, loss of appetite, weight loss. More serious exposures can cause damage to the nerves in the hands and feet (peripheral neuropathy).
Eyes and Vision:	Abnormal color perception and pigment changes in the eyes have been reported among industrial workers exposed to 423-1280 ppm for 5 years or more.
Blood Cells:	Mild forms of anemia have also been associated with exposure to hexane. These are of temporary nature.

Additionally, if mixtures of this gas mixture contain less than 19.5% Oxygen and are released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

CONCENTRATION OF OXYGEN	OBSERVED EFFECT
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea, vomiting, collapse, or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

SKIN and EYE CONTACT: The Hydrogen Sulfide component of this gas mixture may be irritating to the skin. Inflammation and irritation of the eyes can occur at very low airborne concentration of Hydrogen Sulfide (less than 10 ppm). Exposure over several hours may result in “gas eyes” or “sore eyes” with symptoms of scratchiness, irritation, tearing and burning. Above 50 ppm of Hydrogen Sulfide, there is an intense tearing, blurring of vision, and pain when looking at light. Over-exposed individuals may see rings around bright lights. Most symptoms disappear when exposure ceases. However, in serious cases, the eye can be permanently damaged.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this gas mixture, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. However, the Hydrogen Sulfide and Carbon Monoxide components of this gas mixture are toxic to humans. Over-exposure to this gas mixture can cause nausea, dizziness, headaches, collapse, unconsciousness, coma, and death. Due to the presence of Hydrogen Sulfide, over-exposures to this gas mixture can also irritate the skin and eyes; severe eye contamination can result in blindness.

Inhalation over-exposures to Propane, n-Pentane, and n-Hexane can cause anesthetic effects and motor neuropathy (i.e. pain and tingling in feet and hands).

3. HAZARD IDENTIFICATION (Continued)

CHRONIC: Abnormal color perception and pigment changes in the eyes have been reported among persons exposed to 420 -1300 ppm of n-Hexane for five years. Additionally, long-term exposure to low levels of n-Hexane or n-Pentane can affect the nerves in the arms and legs. Effects include numbing or tingling sensation, tiredness, cramps, spasms in legs, difficulty holding objects or walking, loss of appetite and weight loss. Pentane isomers, such as n-Pentane, and Propane can cause sensitization of the heart to epinephrine. Refer to Section 11 (Toxicology Information) for additional information on the components of this gas mixture.

TARGET ORGANS: ACUTE: Respiratory system, blood system, central nervous system, cardiovascular system. CHRONIC: Reproductive system, cardiovascular system.

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn.

No unusual health effects are anticipated after exposure to this gas mixture, due to the small cylinder size. If any adverse symptom develops after over-exposure to this gas mixture, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary.

Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

SKIN EXPOSURE: If irritation of the skin develops after exposure to this gas mixture, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention.

EYE EXPOSURE: If irritation of the eye develops after exposure to this gas mixture, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions may be aggravated by over-exposure to this gas mixture. Carbon Monoxide, a component of this gas mixture, can aggravate some diseases of the cardiovascular system, such as coronary artery disease and angina pectoris. Because of the presence of Hydrogen Sulfide, n-Hexane or n-Pentane in this gas mixture, central nervous system conditions, eye disorders, or skin problems may be aggravated by over-exposure to this gas mixture.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure. Hyperbaric oxygen is the most efficient antidote to Carbon Monoxide poisoning, the optimum range being 2-2.5 atm. A special mask, or, preferably, a compression chamber to utilize oxygen at these pressures is required. Avoid administering stimulant drugs. Be observant for initial signs of pulmonary edema in the event of severe inhalation over-exposures.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

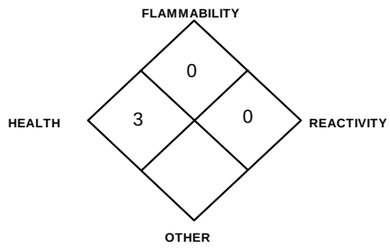
UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture contains toxic gases, Hydrogen Sulfide and Carbon Monoxide, and presents an extreme health hazard to firefighters. This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

NFPA RATING



6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of over-exposure to Hydrogen Sulfide and Carbon Monoxide, the toxic components of this gas mixture, and other safety hazards related to the remaining components of this gas mixture, than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

For emergency disposal, secure the cylinder and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors. Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for Hydrogen Sulfide, Carbon Monoxide, and Oxygen. Hydrogen Sulfide and Carbon Monoxide level must be below exposure level listed in Section 2 (Composition and Information on Ingredients) and Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify cylinders containing a gas mixture with Hydrogen Sulfide or Carbon Monoxide. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Eye wash stations/safety showers should be near areas where this gas mixture is used or stored. All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release. All work practices should minimize releases of Hydrogen Sulfide and Carbon Monoxide-containing gas mixtures.

STORAGE AND HANDLING PRACTICES: Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C, 70°F). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders against physical damage.

Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. **WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.**

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this gas mixture in well-ventilated areas. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of Oxygen, Hydrogen Sulfide, and Carbon Monoxide.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if Carbon Monoxide levels exceed the exposure levels given in Section 2 (Composition and Information on Ingredients) or if oxygen levels are below 19.5%, or if either level is unknown during emergency response to a release of this gas mixture. If respiratory protection is required for emergency response to this gas mixture, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards. The following NIOSH respiratory protection recommendations for Hydrogen Sulfide and Carbon Monoxide are provided for further information.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

NIOSH/OSHA RECOMMENDATIONS FOR HYDROGEN SULFIDE CONCENTRATIONS IN AIR:

Up to 100 ppm: Powered air-purifying respirator with cartridge(s) to protect against hydrogen sulfide; or gas mask with canister to protect against hydrogen sulfide; or SAR; or full-facepiece SCBA.

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Gas mask with canister to protect against hydrogen sulfide; or escape-type SCBA

NOTE: The IDLH concentration for Hydrogen Sulfide is 100 ppm.

NIOSH/OSHA RECOMMENDATIONS FOR CARBON MONOXIDE CONCENTRATIONS IN AIR:

Up to 350 ppm Supplied Air Respirator (SAR)

Up to 875 ppm Supplied Air Respirator (SAR) operated in a continuous flow mode.

Up to 1200 ppm Gas mask with canister to protect against carbon monoxide; or full-facepiece SCBA; or full-facepiece Supplied Air Respirator (SAR).

Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece Supplied Air Respirator (SAR) with an auxiliary positive pressure SCBA.

Escape: Gas mask with canister to protect against carbon monoxide; or escape-type SCBA.

NOTE: End of Service Life Indicator (ESLI) required for gas masks.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: No special protection is needed under normal circumstances of use. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: No special protection is needed under normal circumstances of use. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Nitrogen, the main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ ft^3 (1.153 kg/m^3)

FREEZING/MELTING POINT @ 10 psig: -210°C (-345.8°F)

SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906

SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023

EVAPORATION RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD: Not applicable.

VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

BOILING POINT: -195.8°C (-320.4°F)

pH: Not applicable.

MOLECULAR WEIGHT: 28.01

EXPANSION RATIO: Not applicable.

SPECIFIC VOLUME (ft^3/lb): 13.8

The following information is for the gas mixture.

APPEARANCE AND COLOR: This gas mixture is a colorless gas which has an rotten egg-like odor, due to the presence of Hydrogen Sulfide.

HOW TO DETECT THIS SUBSTANCE (warning properties): Continuous inhalation of low concentrations of Hydrogen Sulfide (a component of this gas mixture) may cause olfactory fatigue, so that there are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation. Wet lead acetate paper can be used for leak detection. The paper turns black in the presence of Hydrogen Sulfide. Cadmium chloride solutions can also be used. Cadmium solutions will turn yellow upon contact with Hydrogen Sulfide.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The thermal decomposition products of Propane, n-Hexane, and n-Pentane include carbon oxides. The decomposition products of Hydrogen Sulfide include water and sulfur oxides. The other components of this gas mixture do not decompose, per se, but can react with other compounds in the heat of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this gas mixture). Lithium reacts slowly with Nitrogen at ambient temperatures. Components of this gas mixture (Hydrogen Sulfide, Propane, n-Pentane, n-Hexane) are also incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride). Carbon Monoxide is mildly corrosive to nickel and iron (especially at high temperatures and pressures). Hydrogen Sulfide is corrosive to most metals, because it reacts with these substances to form metal sulfides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology data are available for the components of this gas mixture:

NITROGEN: There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the

n-PENTANE:

LD_{50} (intravenous, mouse) = 446 mg/kg.

LC_{50} (inhalation, rat) = 364 g/m^3/4 hours

LCLo (inhalation, mouse) = 325 g/m^3/2 hours

n-HEXANE:

Eye, rabbit = 10 mg/ mild

TCLo (inhalation, rat) = 10,000 ppm/7 hr.

TCLo (inhalation, rat) = 5000 ppm/20 hours; teratogenic effects

LD50 (oral, rat) = 28710 mg/kg

LDLo (intraperitoneal, rat) = 9100 mg/kg

LCLo (inhalation, mouse) = 120,000 mg/kg

LD50 (rat, oral): 28,710 mg/kg

ACUTE INHALATION (mouse): 30,000 ppm, narcosis within 30 to 60 minutes; 35,000-40,000 ppm, convulsions and death.

DERMAL (rabbit): 2 to 5 ml/kg for 4 hours resulted in restlessness and discoordination,; death occurred at 5 ml/kg.

HYDROGEN SULFIDE:

LCLo (inhalation, human) = 600 ppm/30 minutes

LDLO (inhalation, man) = 5.7 mg/kg; central nervous system, pulmonary effects

n-HEXANE (continued):

CHRONIC INHALATION (rat): 400-600 ppm, 5 days/week, peripheral neuropathy in 45 days; 850 ppm for 143 days, loss of weight and degeneration of the sciatic nerve. (mouse): 250 ppm, peripheral neuropathy within 7 months; no effects at 100 ppm.

PROPANE:

Long-Term Inhalation: No toxicity or abnormalities were observed when monkeys were exposed to approximately 750 ppm for 90 days. Similar results were obtained when monkeys were exposed to an aerosol spray containing 65% propane and isobutane.

CARBON MONOXIDE:

TCLo (inhalation, mouse) = 65 ppm/24 hours (7-18 preg): rep. effects

TCLo (inhalation, mouse) = 8 pph/1 hour (female 8D post): ter. effects

HYDROGEN SULFIDE (continued):

LCLo (inhalation, human) = 800 ppm/5 minutes

LC_{50} (inhalation, rat) = 444 ppm

CARBON MONOXIDE (continued):

TCLo (inhalation, human) = 600 mg/m^3/10 minutes

LCLo (inhalation, man) = 4000 ppm/30 minutes

TCLo (inhalation, man) = 650 ppm/45 minutes: central nervous system and blood system effects.

LCLo (inhalation, human) = 5000 ppm/5 minutes

LCLo (inhalation, dog) = 4000 ppm/46 minutes

LCLo (inhalation, rabbit) = 4000 ppm

LC_{50} (inhalation, rat) = 1811 ppm/4 hours

LC_{50} (inhalation, guinea pig) = 2450 ppm/4 hours

LC_{50} (inhalation, guinea pig) = 5718 ppm/4 hours

LCLo (inhalation, mammal) = 5000 ppm/5 minutes

LD_{50} (inhalation, wild bird) = 1334 ppm

HYDROGEN SULFIDE (continued):

LC_{50} (inhalation, mouse) = 673 ppm/1 hour

LCLo (inhalation, mammal) = 800 ppm/5 minutes

SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: The Hydrogen Sulfide component of this gas mixture, is irritating to the eyes, and may be irritating to the skin.

SENSITIZATION OF PRODUCT: The components of this gas mixture are not known to be skin or respiratory sensitizers. Pentane isomers (i.e. n-Pentane) and Propane can cause cardiac sensitization to epinephrine.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this gas mixture on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for the components of this gas mixture.

Embryotoxicity: This gas mixture contains components that may cause embryotoxic effects in humans; however, due to the small total amount of the components, embryotoxic effects are not expected to occur.

Teratogenicity: This gas mixture is not expected to cause teratogenic effects in humans due to the small cylinder size and small total amount of all components. The Carbon Monoxide component of this gas mixture which exists up to 1%, can cause teratogenic effects in humans. Severe

11. TOXICOLOGICAL INFORMATION (continued)

exposure to Carbon Monoxide during pregnancy has caused adverse effects and the death of the fetus. In general, maternal symptoms are an indicator of the potential risk to the fetus since Carbon Monoxide is toxic to the mother before it is toxic to the fetus.

Reproductive Toxicity: The components of this gas mixture are not expected to cause adverse reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES (BEIs): Biological Exposure Indices (BEIs) have been determined for the components of this gas mixture, as follows:

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
CARBON MONOXIDE • Carboxyhemoglobin in blood • Carbon monoxide in end-exhaled air	 • End of shift • End of shift	 • 3.5% of hemoglobin • 20 ppm
n-HEXANE • 2,5-Hexanedione in urine • n-Hexane in end-exhaled air	• End of shift	• 5 mg/g creatinine

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this gas mixture.

OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log K_{ow} = -0.65

PROPANE: Log K_{ow} = 2.38. Water Solubility = 62.4 ppm, 25°C. Propane is readily degraded by soil bacteria.

PENTANE: Log K_{ow} = 3.39. Water Solubility = 38.5 mg/L. LOG BCF (n-pentane) = calculated, 1.90 and 2.35, respectively. Photolysis, hydrolysis, and bioconcentration are not anticipated to be important fate processes. Biodegradation and soil adsorption are anticipated to be more important processes for this compound.

n-HEXANE: Log K_{ow} = 3.90-4.11. Water Solubility = 9.5 mg/L. Estimated Bioconcentration Factor =2.24 and 2.89. Bioconcentration in aquatic organisms is low. Hexane is volatile. Rapid volatilization from water and soil is anticipated for this compound. Hexane will float in slick on surface of the water

HYDROGEN SULFIDE: Water Solubility = 1 g/242 mL at 20°C.

CARBON MONOXIDE: Water solubility = 3.3 ml/100 cc at 0 °C, 2.3 ml at 20°C.

NITROGEN: Water Solubility = 2.4 volumes Nitrogen/100 volumes water at 0°C; 1.6 volumes Nitrogen/100 volumes water at 20°C.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this gas mixture's effects on plant and animal life. The Hydrogen Sulfide and Carbon Monoxide components of this gas mixture, can be deadly to exposed animal life, producing symptoms similar to those experienced by humans. This gas mixture may also be harmful to plant life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on the effects of this gas effects on aquatic life. The presence of more than a trace of Carbon Monoxide is a hazard to fish. The following aquatic toxicity data are available for the Hydrogen Sulfide component of this gas mixture.

TLm (Asellussp) = 0.111 mg/L/96 hour
TLm (Cranfgonyx sp) =1.07 mg/L/96 hour
TLm (Gammarrus) = 0.84 mg/L/96 hour
LC_{50} (fly inhalation) = 380 mg/m^3/960 minutes
LC_{50} (fly inhalation) = 1500 mg/m^3/7 minutes
TLm (Lepomis macrochirus, bluegill sunfish) = 0.0478 mg/L/96 hour
TLm (Lepomis macrochirus, bluegill sunfish) = 0.0448 mg/L/96 hour at 21-22 °C
TLm (Pimephlaes promelas, fathead minnow) = 0.0071-0.55 mg/L/96 hour
TLm (Salvenilis foninalis, brook trout) = 0.0216-0.038 mg/L/96 hour at 8-12.5 °C

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

THIS GAS MIXTURE IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (*Oxygen, Nitrogen)*or the gas component with the next highest concentration next to Nitrogen.

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not Applicable

DOT LABEL(S) REQUIRED: Class 2.2 (Non-Flammable Gas)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas is considered as Dangerous Goods, per regulations of Transport Canada.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (*Oxygen, Nitrogen)*or the gas component with the next highest concentration next to Nitrogen.

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not Applicable

HAZARD LABEL: Class 2.2 (Non-Flammable Gas)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: 0.12

ERAP INDEX: None

PASSENGER CARRYING SHIP INDEX: None

PASSENGER CARRYING ROAD VEHICLE OR PASSENGER CARRYING RAILWAY VEHICLE INDEX: 75

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126

NOTE: Shipment of compressed gas cylinders via Public Passenger Road Vehicle is a violation of Canadian law (Transport Canada Transportation of Dangerous Goods Act, 1992).

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: This gas is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
n-Hexane	NO	YES	YES
Hydrogen Sulfide	YES	YES	YES

15. REGULATORY INFORMATION (Continued)

U.S. SARA THRESHOLD PLANNING QUANTITY: Section 302 EHS TPQ = Hydrogen Sulfide = 500 lbs (227 kg);
U.S. TSCA INVENTORY STATUS: The components of this gas mixture are listed on the TSCA Inventory.
U.S. CERCLA REPORTABLE QUANTITY (RQ): Hexane = 5000 lb (2270 kg); Hydrogen Sulfide = 100 lbs (45.4 lb)
OTHER U.S. FEDERAL REGULATIONS:

- Hydrogen Sulfide, Carbon Monoxide, Propane, n-Pentane and n-Hexane are subject to the reporting requirements of CFR 29 1910.1000.
- Hydrogen Sulfide, Propane and n-Pentane are subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for each of these gases is 10,000 pounds and so this mixture will not be affected by the regulation.
- Depending on specific operations involving the use of this gas mixture, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Hydrogen Sulfide is listed in Appendix A of this regulation. The Threshold Quantity for Hydrogen Sulfide under this regulation is 1500 lbs.
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR part 82).
- Nitrogen, Oxygen and n-Hexane are not listed Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Hydrogen Sulfide is listed under this regulation in Table 1 as a Regulated Substance (Toxic Substance), in quantities of 10,000 lbs (4,553 kg) or greater. Carbon Monoxide, Propane and n-Pentane are listed under this regulation in Table 3, as Regulated Substances (Flammable), in quantities of 10,000 lbs (4,553 kg) or greater, and so this mixture will not be affected by the regulation.

U.S. STATE REGULATORY INFORMATION: The components of this gas mixture are covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
California - Permissible Exposure Limits for Chemical Contaminants: Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Florida - Substance List: Oxygen, Carbon Monoxide, n-Pentane, n-Hexane, Hydrogen Sulfide.
Illinois - Toxic Substance List: Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Oxygen, Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Michigan - Critical Materials Register: No.
Minnesota - List of Hazardous Substances: Carbon Monoxide, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Missouri - Employer Information/Toxic Substance List t: n-Pentane, n-Hexane, Propane, Hydrogen Sulfide.
New Jersey - Right to Know Hazardous Substance List: Oxygen, Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: Hydrogen Sulfide.
Pennsylvania - Hazardous Substance List: Oxygen, Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Rhode Island - Hazardous Substance List: Oxygen, Carbon Monoxide, Nitrogen, Propane, n-Pentane, n-Hexane, Hydrogen Sulfide.
Texas - Hazardous Substance List: n-Pentane, n-Hexane, Propane, Hydrogen Sulfide.
West Virginia - Hazardous Substance List: n-Pentane, n-Hexane, Propane, Hydrogen Sulfide.
Wisconsin - Toxic and Hazardous Substances: n-Pentane, n-Hexane, Propane, Hydrogen Sulfide

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The Carbon Monoxide component of this gas mixture is on the California Proposition 65 lists as a chemical known to the State of California to cause birth defects or other reproductive harm.
ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The components of this gas mixture are on the Canadian DSL Inventory.
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this gas mixture are not on the CEPA Priorities Substances List.
CANADIAN WHMIS CLASSIFICATION: This gas mixture is categorized as a Controlled Product, Hazard Classes A and D2A, as per the Controlled Product Regulations.

16. OTHER INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. CALGAZ will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to 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 make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

P-1 *"Safe Handling of Compressed Gases in Containers"*
AV-1 *"Safe Handling and Storage of Compressed Gases"*
"Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
619/670-0609

Fax on Demand: 1-800/231-1366

AIR LIQUIDE™

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	:	**09/21/2022**
REVISION NUMBER	:	**9**

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APPENDICES

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 disease caused by SARS-CoV-2, a coronavirus discovered in 2019. The virus spreads mainly from person to person through respiratory droplets produced when an infected person coughs, sneezes, or talks. Some people who are infected may not have symptoms. 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?[1]

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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1 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).
- Morgue workers performing autopsies, which generally involve aerosol-generating procedures on the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

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

You are up to date with your COVID-19 vaccines if you have completed a COVID-19 vaccine primary series and received the most recent booster dose recommended for you by CDC. Additional information concerning vaccinations can be found at the following link.

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 that 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 (≥ 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 (≥100. 4°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

Depending on local/state/client requirements, Subcontractors who shall perform work onsite may be 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 if required by local/state/client requirements, 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.

IF YOU Tested positive for COVID-19 or have symptoms, regardless of vaccination status:	**Stay home for at least 5 days** Stay home for 5 days and isolate from others in your home. Wear a well-fitted mask if you must be around others in your home.	**Ending isolation if you had symptoms** End isolation after 5 full days if you are fever-free for 24 hours (without the use of fever-reducing medication) and your symptoms are improving. **Ending isolation if you did NOT have symptoms** End isolation after at least 5 full days after your positive test. **If you were severely ill with COVID-19** You should isolate for at least 10 days. Consult your doctor before ending isolation.	**Take precautions until Day 10** **Wear a mask** 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. **Avoid travel** **Avoid being around people who are at high risk**

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. Consult with your OM regarding whether your situation requires quarantine following close contact. 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 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 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;
- 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:	

Prior to entry onto a field site, the following questions shall be asked by the Subcontractor Supervisor to their work crew. **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.**

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. **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.**

1. Have you experienced any signs/symptoms of COVID-19 such as fever (≥100.4°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	☐ NEW ☒ REVISED	PAGE 1 of 2

JSA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)
Generic	**Fieldwork**	**Working in Areas Affected by Coronavirus**

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
Kristina DeLuca	Health and Safety Specialist	Brian Hobbs	CHSD

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST	☐ GOGGLES	☐ AIR PURIFYING RESPIRATOR	☒ GLOVES – Leather/cut-resistant in field and nitrile as needed
☒ HARD HAT – In field	☐ FACE SHIELD	☐ SUPPLIED RESPIRATOR	
☐ LIFELINE / BODY HARNESS	☐ HEARING PROTECTION	☒ PPE CLOTHING – High visibility vest in field	☐ OTHER
☒ SAFETY GLASSES – In field	☒ SAFETY SHOES – Steel/composite toe in fie		

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Face covering/mask, nitrile gloves, hand soap, water source, hand sanitizer, disinfectant spray and disinfectant wipes.

Commitment to Safety – All personnel onsite will actively participate in SPSA performance by verbalizing SPSAs throughout the day.

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.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Project Preplanning	N/A	• Review and follow COVID-19 CDC, Roux, Client and local orders/protocols. • 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. • 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. • Use the minimum number of employees necessary to safely complete the work.
2. Mobilization	**Exposure:** Becoming infected or infecting co-workers	**Personal/Rental/Roux Owned Vehicle** • Avoid carpooling, unless all individuals are up to date on vaccinations. • Verify workers/other people are not approaching vehicle prior to exiting the vehicle. Maintain 6' of distance from general public, as appropriate. **Public Transportation** • 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. **Hotel Stay (Refer to COVID-19 H&S Guidance for more info)** • If a hotel stay is deemed necessary for the given field work, ensure that you clean your room upon initial arrival. • 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.
3. Tailgate Meeting	**Exposure:** Becoming infected or infecting co-workers	• Perform outside or indoors in areas with ample ventilation. • If unvaccinated, maintain at least a 6+ ft distance between you and others. • Discuss primary infection prevention measures listed below. • 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.

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
[2] 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.
[3] 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	**Exposure:** Becoming infected or infecting co-workers	• 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. • Don face coverings as appropriate. • 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. • Minimize shaking hands or touching others. • Minimize sharing of equipment or other items with co-workers and subcontractors unless wearing appropriate PPE (e.g. nitrile gloves), as appropriate. • If anyone is experiencing COVID-19 signs or symptoms in your vicinity, stop work and leave the area. • Do not work in areas with limited ventilation with others. • 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. • Clean work surfaces/areas with approved cleaners you're responsible for (ex: desk, office doorknob, computer, etc.) at least daily. • 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.

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.

[1] Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.
[2] 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.
[3] 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.

APPENDIX D

Personal Protective Equipment (PPE) Management Program

PERSONAL PROTECTIVE EQUIPMENT MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY DIRECTOR	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**01/2019**
REVIEW DATE	:	**03/2024**
REVISION NUMBER	:	**5**

TABLE OF CONTENTS

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 employees in the workplace. 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 respiratory tract are usually the first body tissues that are exposed to chemical contaminants. These tissues provide barriers to some chemicals but, in many cases, are damaged themselves or are highly permeable by certain chemical compounds. PPE, therefore, is used to minimize or eliminate chemical compounds from coming into contact with these first barrier tissues.

Proper PPE selection is essential in preventing exposures. The Project Manager (PM) or health and safety personnel making the selection will have to consider several factors. The level of protection, type, and kind of equipment selected depends on the hazardous conditions. In some cases, additional selection factors include cost, availability, compatibility with other equipment, and performance. All these factors must be accurately assessed before work can be safely carried out.

3.1.1 Training

Training shall be provided to all field-based employees in properly using and caring for PPE. Training shall include, but not be limited to, the initial 40-hour HAZWOPER training, annual 8-hour HAZWOPER refresher training, and site-specific PPE training. The training program includes when PPE is necessary, what types of PPE are required; how to don, doff, adjust, and wear PPE; the limitations of PPE; the proper care, maintenance, useful life, signs of PPE failure and emergency procedures to follow in the event of PPE failure and disposal of PPE. In addition, retraining shall be conducted when workplace changes require a change in PPE when an employee demonstrates a lack of knowledge or improper use of PPE is identified.

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 (General Industry) and 1926.95 (Construction). 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. All manufacturer's recommendations for PPE care and use shall be followed. All PPE shall be maintained in a sanitary and reliable condition. Additionally, proper fit and size shall be evaluated to ensure adequate employee protection. Should PPE become defective, it shall be immediately removed from service and discarded.

The 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 - Regulated by 29 CFR 1910.138
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) - Specified in NFPA 1991/1992/1994.

3.2.1 PPE Inspection, Cleaning Maintenance, and Storage

The Office Health and Safety Manager (OHSM) or their designee is responsible for procuring PPE, in accordance with this management program. Single-use/disposable PPE should be purchased and used whenever practicable.

3.2.1.1 PPE Inspection

Roux employees must inspect PPE regularly, before and after each use, to check for defects and damage. Garments and other PPE in central storage must be inspected at least annually or as recommended by the manufacturer by the OHSM, Equipment Manager and/or their designee. Defective or damaged equipment must be tagged as out-of-service, immediately removed from the work site and discarded.

3.2.1.2 PPE Cleaning and Maintenance

All Roux employees are responsible for routine cleaning of their assigned PPE. Decontamination of PPE is addressed within Roux's Site Control and Decontamination Program as well as specified within site-specific health and safety plans. As appropriate, Roux employees should be issued single-use PPE when practicable to minimize the requirement for decontamination. When performing routine cleaning of reusable PPE:

- Always follow the manufacturer's recommendations to avoid damaging the PPE. For example, some cleaning solutions compromise the integrity of protective helmets' shells.
- Clean and maintain PPE according to the manufacturer's recommendations. Before being re-issued, PPE should be thoroughly sanitized.
- Disassemble, wash, and sanitize reusable respirators after each use, refer to Roux's Respiratory Protection Management Program.

Employees are not authorized to repair PPE without prior approval from the Health and Safety Department. Reusable PPE may require maintenance by the manufacturer to maintain integrity and certification. Many

manufacturers specify which repairs, if performed by the end-user, will void product warranty, therefore Roux employees are not typically authorized to perform such maintenance or repairs.

3.2.1.3 PPE Storage

Certain equipment failures can be directly attributed to improper storage. The OHSM or Equipment Manager (or another designated person) is responsible for implementing procedures for appropriate PPE storage, for equipment that is centrally stored. Both central storage and dedicated PPE provided to employees should be stored using the following:

- Store goggles and safety glasses in protective cases.
- Store PPE (such as helmets, boots, etc.) in clean, dust-proof containers or bags out of direct sunlight.
- PPE should ideally be stored under climate-controlled conditions. PPE, stocked gear bags, and/or go-kits should not be stored in hot, cold, or other extreme environmental conditions, and they should not be stored in vehicles (government-owned or rentals) for even short periods of time. Do not store helmets on the rear window shelf of a vehicle.
- Store different kinds of clothing and gloves separately to prevent errors in selection.
- Hang or fold protective clothing in accordance with manufacturers' recommendations.
- Never store contaminated PPE near new protective clothing or street clothing. Potentially contaminated, reusable clothing must be stored (usually bagged) away from new PPE, in a well-ventilated area, with good air flow around each item, until the garment is decontaminated or disposed.
- See Roux's Respiratory Protection Management Program for detailed procedures on storing respirators.

3.3 Fitting, Donning and Doffing PPE

Roux shall provide appropriately sized PPE for Roux employees. Improper fitting such as tight-fitting garments, can tear, especially at the knees, crotch, shoulders, back, and elbows due to movement. Protective clothing that is too large can easily snag and/or limit a user's dexterity. The Roux PM shall ensure site/project-specific PPE is kept in a sufficient stock of appropriately sized PPE (e.g., Level C ensembles). The OHSM, Equipment Manager and/or their designee shall ensure a sufficient stock of appropriately sized PPE is maintained in central storage locations.

The Site Supervisor (SS)/Site Health and Safety Officer (SHSO) is responsible for ensuring that site-specific procedures for donning and doffing PPE are incorporated into site-specific HASPs. Donning and doffing procedures may differ depending on the type of PPE and clothing (e.g., Level D, Modified Level D, Level C) utilized. Figures 1-4, provide examples of procedures that can be used to don and doff Levels A through D and are provided as a reference. Site-specific conditions may warrant adjustments to such procedures. Consult the CHSD for additional information.

Site-specific donning and doffing procedures should include the use of an assistant where necessary. Donning and doffing certain types of PPE without assistance could risk PPE failure or damage. Care must be taken to prevent the spread of contaminants on the PPE. Decontamination procedures should limit the potential for cross contamination and may include gross decontamination of outer boots, gloves, and suits as necessary to prevent tracking of contaminants into the contamination reduction zone (CRZ) and clean zone(s).

3.4 Controlling Hazards Associated with PPE Use

PPE use can pose potential health and safety hazards, which range from minor discomfort to life-threatening height stroke. The magnitude of the potential hazard can vary and will depend on various factors, including an individual's fitness level, the type of PPE worn, the work demands, individual work practices, duration of work and environmental conditions. The use of PPE can also lead to reduced efficiency and work performance.

Among hazards associated with PPE use, heat stress emerges as a prevalent and significant hazard. Particularly, the use of substantial and/or impermeable attire, such as heavy coveralls, Tyvek suits, splash suits, or Level A or B suits, alongside strenuous work, amplifies the risk of heat stress. Regular monitoring for indications of heat stress is imperative for workers operating in such conditions. Roux's Heat Illness Prevention Program lays out requirements for signs and symptoms as well as preventative measures to mitigate the potential for heat illness. In addition, cold environments can pose adverse risk, such examples include use of non-insulated steel-toe safety shoes in frigid conditions which has the potential to increase the risk of frostbite, while safety gloves worn for chemical protection may inadequately insulate hands from the cold.

It is the responsibility of Project Teams to integrate site-specific protocols to manage PPE hazards into such site-specific HASPs. These protocols can encompass considerations like work/rest ratios, crew rotations, and other accommodations for exceptionally demanding conditions.

The following measures are recommended for controlling hazards posed by PPE use:

- Prioritize through the hierarchy of controls with a focus on elimination, substitution, engineering, work practice and administrative control implementation rather than sole reliance on PPE. PPE shall be considered the last line of worker protection.
- Workers should maintain physical fitness to be able to withstand the potential physical strain of PPE use. A physically fit individual will endure less physiological strain, manifesting in a lower heart rate, reduced body temperature (indicating diminished retained body heat), more effective sweating, slightly lower oxygen consumption, and carbon dioxide production. Furthermore, acclimatization to extreme environmental conditions, such as high temperatures, can influence work performance and physical capacity.
- Understand the symptoms of PPE failure. Workers encountering any of these symptoms while donning PPE should promptly notify their onsite SHSO and/or SS:
    - Perception of odors when wearing a respirator
    - Skin irritation
    - Acute discomfort
    - Difficulty breathing
    - Unusual fatigue
    - Dizziness
    - Inability to see, hear, or speak clearly
    - Uncomfortable restriction of movement
    - Rapid pulse, nausea, or chest pain
- Implement a buddy system. Especially in situations where there is a need for increased level of protection (e.g. Level A-C) workers should work in pairs or teams, and are instructed to monitor the integrity of their team/partners gear and remain alert for symptoms of PPE failure.

3.5 PPE Selection

For site-specific work, the Project Manager in consultation with the Health and Safety Department has overall responsibility for coordinating the selection and distribution of PPE to field staff and for ensuring that the selected PPE is appropriate for the site-specific hazards. Generally speaking Roux employees are not engaged in emergency response or perform work at uncontrolled hazardous waste sites, if the case the CHSD shall be made aware of the work and consult with the Project Team on appropriate PPE selection. Most work falls under environmental sampling of low concentration water/soil/perimeter air. Therefore work is carried out in Level D PPE. Upgrades would be based on more information as it becomes available. The United States Environmental Protection Agency (EPA) has created Guidelines for PPE Ensemble Selection to assist workers in selecting PPE ensembles for specific activities and tasks and determining which ensembles and air monitoring equipment should be used to address specific chemicals. Guidelines to Ensembles for Specific Activities/Tasks Where Chemical Exposure is Possible is provided as a reference as Appendix A.

3.6 Protective Clothing Selection Criteria

3.6.1 Chemicals Present

The most important factor in selecting PPE is the determination of what chemicals the employee may be exposed to. The number of chemicals on field investigations 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 air, soil, water, or other site media samples. When data are lacking, research into the hazardous materials used or stored at the site can be used to infer potential chemical exposures on the site.

The most appropriate clothing shall be selected once the known or suspected chemicals have been identified and considered based on the type of work to be performed.

Protective garments are made of several different substances for protection against specific chemicals. There is no universal protective material. All will decompose, permeate, or otherwise fail to protect under given circumstances. Fortunately, most manufacturers make guides to using 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 with degradation tables to determine the most appropriate protective material for the specific chemical hazard(s).

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; therefore, the selected material may be adequate for the particular chemical of most concern 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 (i.e., using several layers of protective materials) affords the best protection.

3.6.2 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 solid state. Airborne and liquid chemical concentrations should be compared to the OSHA standards and 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 PCBs on-site may be low because they are 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, PCBs have been assigned a skin designation in the OSHA and ACGIH exposure limit tables.

3.6.3 Physical State

The characteristics of a chemical may range from nontoxic to highly 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. However, organic lead in a liquid could be readily absorbed through the skin. Soil is frequently contaminated with hazardous materials. Concentrations will vary from a few parts per million to nearly one hundred percent by volume. The degree of hazard depends on the type of soil and concentration of the chemical. Generally speaking, "dry" soils that have not become airborne do not pose a hazard to site personnel if they take minimal precautions, such as wearing lightweight gloves.

3.6.4 Length of Exposure

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

3.6.5 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. Using leather gloves and a heavy apron over other normal protective clothing will help prevent damage to the normal PPE and thus reduce worker exposures.

3.6.6 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 thick gloves. Therefore, the PPE selection process must consider the task being performed and provide PPE alternatives or techniques that maintain dexterity while still protecting the worker (e.g., wearing tight latex gloves over more bulky hand protection to increase dexterity).

3.6.7 Ability to Decontaminate

If disposable clothing cannot be used, the ability to decontaminate the materials selected must be taken into consideration. Once a chemical makes contact with the material, the PPE must be cleaned before reusing it. If the chemical has completely permeated the material, the clothing cannot be adequately decontaminated, and the material should be discarded.

3.6.8 Climactic Conditions

The human body works best with few restraints from clothing. Protective clothing adds a body burden by increasing weight, restricting movement, and preventing the body's 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 frigid temperatures. If there are any questions about the stability of the protective materials under different conditions, the manufacturer should be contacted before using PPE in the field.

3.6.9 Work Load

Like climactic conditions, the type of work activity may affect work duration and personnel's ability 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. Modified work practices may include allowing more time for individual job tasks and implementing work/rest cycles per NIOSH and ACGIH thermal stress recommendations. Special consideration should be given to the selection of clothing that protects the worker and adds the least burden when personnel are required to perform strenuous tasks. Excessive bodily stress frequently represents the most significant hazard encountered during fieldwork.

3.6.10 Types of Protective Materials

1. Cellulose or Paper: suitable for nuisance dust and coarse fibers.
2. Natural and Synthetic Fibers
    a. Tyvek™: suitable small-sized hazardous particles, including lead, asbestos, and mold.
    b. Tychem™: is suitable for a variety of hazards, from light liquid splashes to heavy exposures to industrial chemicals and agents.
    c. Nomex™: is suitable for flame-resistance, radiation resistance, acids, alkalis, fluorocarbon refrigerants (CFCs), and non-polar solvents.
3. Elastomers
    a. Polyethylene: suitable for polar substances and solvents.
    b. Saran™ : suitable for flame-resistance, acids, alkalis, oils, and organic solvents.
    c. Polyvinyl Chloride (PVC): suitable for alcohols, oils, inorganic acids, alkalis, and salts.
    d. Neoprene: suitable for polar/non-polar substances, petroleum mixtures, and ≤ 200 F heat resistance.
    e. Butyl Rubber: suitable for polar substances and solvents.
    f. Viton: suitable for non-polar substances, petroleum mixtures, and ≤ 200 F heat resistance.
    g. Nitrile: suitable for polar/non-polar substances and petroleum mixtures.

3.7 Protection Levels

3.7.1 Level A Protection

Level A protection (a fully encapsulated suit) is used when skin hazards exist or when no known data positively rule out skin and other absorption hazards. Per the Roux Respiratory Protection Management

Program, Roux employees are not authorized to enter an IDLH atmosphere; therefore, the program does not allow supplied air respirators (SARs) or self-contained breathing apparatus (SCBA). At no time will Level A work be performed without the consent of the CHSD and OM.

The following conditions warrant the use of Level A protection:

- Hazardous substances have been identified and require the highest level of protection for skin, eyes, and the respiratory system;
- The atmosphere contains less than 19.5% oxygen or an atmosphere immediately dangerous to life and health (IDLH) that have not been ruled out;
- Site operations involve a high potential for splash, skin immersion, or exposure to suspected skin hazards;
- Direct-reading instruments indicate high levels of unidentified but potentially hazardous vapors or gases in the air (e.g., 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
- Direct-reading instruments are not available to test the air and suspected highly toxic substances may be present.

It may be necessary to base the decision to use Level A protection on indirect evidence. Other conditions that may indicate the need for Level A protection include:

- Confined spaces;
- Sites containing known skin hazards;
- Sites with no established history to rule out skin and other absorption hazards;
- Site exhibiting signs of acute mammalian toxicity (e.g., dead animals, illnesses associated with past entry into the site by humans);
- Sites at which sealed drums of unknown materials must be opened;
- Visible indicators such as leaking containers or smoking chemical fires; 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.

Table 1: Recommended Level A Ensemble Components			
Component	**Type**	**Manufacturer / Recommended Material**	**Notes**
Respirator	Positive-pressure full- facepiece SCBA or positive-pressure supplied-air respirator with escape SCBA[1]	NIOSH approved respirator	See Roux's Respiratory Protection Program. Roux employees are not approved to utilize Supplied Air (SAR) and/or Self-contained breathing apparatus (SCBA).
Suit	Totally encapsulated chemical- and vapor-protective suit	DuPont® Tychem™ or Responder CSM™	Other material types may be substituted based on known contaminants.
Inner Gloves	Light weight	Nitrile, Neoprene, PVC, or Viton®	Other material types may be substituted based on known contaminants.
Outer Gloves	Integral part of suit	See Appendix A for additional information	Confirm chemical performance rating for suspected contaminants. Glove material may have different performance ratings than suit material. All fully-encapsulating suit materials must be compatible with substances involved.
Inner Boot	Integral Part of Suit	-	-
Outer Boot	HazMat boot[2]	–	Confirm chemical performance rating of outer boot for suspected contaminants. Provides slip/abrasion resistance.
Hard Hat	Standard[3]	-	-

[1] Must be NIOSH approved.
[2] Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
[3] Must comply with the applicable ANSI standard.

3.7.2 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. At no time will Level B work be performed by Roux personnel without the consent of the CHSD and OM.

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, particulates, or splashes of materials that will affect personnel's skin.

Table 2: Recommended Level B Ensemble Components

Component	Type	Manufacturer / Recommended Material	Notes
Respirator	Positive-pressure full- facepiece SCBA or positive-pressure supplied-air respirator with escape SCBA[1]	NIOSH approved respirator	See Roux's Respiratory Protection Program. Roux employees are not approved to utilize Supplied Air (SAR) and/or Self-contained breathing apparatus (SCBA).
Suit	Chemical-resistant clothing (liquid-splash protective suit with integral boot and hood)[2]	DuPont® Tychem® CPF 3	Other material types may be substituted based on known contaminants.
Inner Gloves	Light/medium weight	Nitrile, Neoprene, PVC, Viton®, or PE/EVAL	Other material types may be substituted based on known contaminants.
Outer Gloves	Medium/heavy weight	Butyl MIL-G12223, Nitrile, Neoprene, PVC, Viton®, PE/EVAL, or heavy weight Nitrile or Neoprene	Confirm chemical performance rating. Other material types may be substituted based on known contaminants.
Inner Boot	Safety work boot	–	Other boot types may be substituted based on known contaminants and physical hazards. Puncture resistant shanks may be required.
Outer Boot	Heavy weight Latex booties or outer boots[2]	Latex booties are used to protect suit for light duty applications. NFPA-rated outer boots may be required based on anticipated site conditions and tasks.	Other outer boot coverings may be substituted based on known contaminants/anticipated tasks.
Hard Hat	Standard[3]	-	-

[1] Must be NIOSH approved.
[2] Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
[3] Must comply with the applicable ANSI standard.

3.7.3 Level C Protection

Level C protection is utilized when skin and respiratory hazards are well defined, and the criteria for using 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 an emergency escape respirator during specific initial entry and site reconnaissance situations or when applicable after that.

Table 3: Recommended Level C Ensemble Components

Component	Type	Manufacturer / Recommended Material	Notes
Respirator	Full-face air-purifying respirator with appropriate cartridge[1]	NIOSH approved respirator	See Roux's Respiratory Protection Program for information about the brand, model, acceptable configurations, and specific care instructions for the standard issue respirator. Half-faced respirators may be donned if hazard assessment warrants.
Suit	Puncture/tear resistant suit material with boot and hood[2]	DuPont® Tychem® CPF 2/CPF 3 or Saranex	Other material types may be substituted based on known contaminants, if considered more appropriate.
Inner Gloves	Light weight	Nitrile, Neoprene	Other material types like Neoprene, PVC, Viton®, or PE/EVAL may be substituted based on known contaminants, if considered more appropriate.
Outer Gloves	Medium/heavy weight	Butyl, Nitrile, or other work glove	Confirm chemical performance rating. Other material types may be substituted based on known contaminants, if considered more appropriate.
Inner Boot	Safety work boot	–	Other boot types may be substituted based on known contaminants and physical hazards. Puncture resistant shanks may be required.
Outer Boot	Heavy weight Latex booties or outer boots[2]	Latex booties are used to protect suit for light duty applications. NFPA rated outer boots may be required based on anticipated site conditions and tasks.	Other outer boot coverings may be substituted based on known contaminants.
Hard Hat	Standard[3]	-	-
Eye Protection	Safety glasses/goggles[3,4]	-	-

1 Must be NIOSH approved.
2 Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
3 Must comply with the applicable ANSI standard.
4 In the case a ½ face respirator is worn eye protection is required.

3.7.4 Level D Protection

Level D is the basic work uniform. Level D is worn when the atmosphere contains no known hazard. Work functions preclude splashes, immersion, potential for inhalation, or direct contact with hazard chemicals. For most Roux field jobs Level D is the standard minimum level of protection worn.

Table 4: Recommended Level D Ensemble Components

Component	Type	Manufacturer / Recommended Material	Notes
Respirator	None	-	-
Suit	Coveralls, street clothes, or disposable Tyvek suit	–	Other types may be substituted as appropriate.
Inner Gloves	N/A		
Outer Gloves	As appropriate for physical hazards and for comfort	–	-
Boot	Safety work boot	–	Roux's standard safety boot is 6", steel/composite safety toe, and electrical hazard (EH) rated.
Outer Boot Covering	As appropriate	–	–
Hard Hat	Standard[3]	-	-
Eye Protection	Safety glasses/goggles[3]	-	-
High Visibility Clothing	High Visibility Vest /Jacket[3]	-	ANSI Class 2 Safety Vests/Jackets are the standard. Class 3 Safety vests/jackets shall be worn in worksites with 50+ MPH traffic.
Hearing Protection	Ear muffs/plugs	-	Workers exposed to excessive noise shall don hearing protection. Refer to Roux's Hearing Conservation Program for more information.

[1] Must be NIOSH approved.
[2] Must meet NFPA 1991/NFPA 1994 requirements depending on the site hazard assessment.
[3] Must comply with the applicable ANSI standard.

3.7.5 Level E Protection

Level E protection is used when radioactivity above 10 millirems per hour (mrems/hr) is detected at the site. Personal protective equipment for Level E includes:

- Coveralls;
- Air purifying respirator (i.e., P100 or equivalent);
- Time limits on exposure;
- Appropriate dermal protection for the type of radiation present, and

- Radiation dosimetry and ambient monitoring.

3.7.6 Additional Considerations

Fieldwork 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. Foot protection is needed on every 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 shoe coverings or "booties" can be worn over the boots. Shoe coverings should be designed with soles to help prevent slips. Using disposable shoe coverings when contacting liquid contamination can on and reduce overall decontamination requirements. If non-liquids are to be encountered, a Tyvek™ bootie could be used. The advantage of booties is questionable if the ground contains any sharp objects. Boots should be worn with either cotton or wool socks to help absorb perspiration.
2. If the site requires 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, as this will affect the respirator's fit.

   Some types of protective materials conduct heat and cold readily. In cold conditions, natural material clothing should be worn under protective clothing. Protective clothing should be removed before allowing a person "to get warm." Applying heat, such as with a space heater, to the outside of the protective clothing may drive contaminant permeation. 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 so that the person has mobility.
4. Atmospheric conditions such as precipitation, temperature, wind direction, humidity, wind velocity, and pressure determine the behavior of contaminants in air or the potential for volatile materials to become airborne. These parameters should be considered in determining the need for and the level of protection.
5. A program must be established for periodic air monitoring during site operations. Without an air monitoring program, any changes to air quality would go undetected and might jeopardize on-site personnel. Monitoring can be done with various types of air pumps and filtering devices, followed by laboratory analysis of the filtration media, personnel dosimeters, and periodic walk-throughs by personnel carrying real-time direct-reading 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 an SCBA and the possibility of an IDLH atmosphere exists. The use and placement of escape masks should be made on a case-by-case basis. Escape masks should be strategically located at the site in areas with higher potential for vapors, gases, or particulates.

3.8 Decontamination of PPE

Roux prefers the use of single use PPE to minimize the requirement for significant decontamination. The following procedures shall be considered should a field project require the need for decontamination of PPE. Roux has also developed a Site Control and Decontamination Management Program.

3.8.1 Site-Specific Decontamination Plans

The Project Manager (or another authorized individual) is responsible for formulating the site-specific PPE decontamination plan as an integral part of the Health and Safety Plan (HASP). The SHSO/SS' responsibilities include ensuring the plan's implementation and adapting it as site conditions evolve. Refer to Roux's Site Control and Decontamination Management program for additional requirements.

The decontamination plan, often created in conjunction with PPE selection, must be established prior to workers entering potentially contaminated areas. The plan should address the following key aspects:

- Decontamination Hazard Evaluation and Risk Assessment: Assessing risks associated with decontamination processes.
- PPE for Decontamination Line Assistants: Specifying appropriate PPE for personnel involved in decontamination.
- Roles and Responsibilities During Decontamination: Defining tasks and duties during the decontamination process.
- Layout and Quantity of Decontamination Stations: Determining the number and arrangement of decontamination stations, along with the designated PPE decontamination procedures at each station.
- Decontamination Equipment: Identifying the necessary equipment for effective decontamination.
- Decontamination Methods: Describing the methods and protocols for decontaminating personnel and equipment.
- Preventing Contamination of Clean Areas: Outlining procedures to prevent contamination of uncontaminated zones.
- Minimizing Contact with Contaminants During CPC Removal: Providing guidelines to reduce wearer exposure during the removal of Chemical Protective Clothing (CPC).
- Disposal Procedures for Inadequately Decontaminated Clothing and Equipment: Ensuring proper disposal practices for items that have not been adequately decontaminated.

The initial decontamination plan, which is developed in conjunction with the initial site hazard assessment, should be based on worst-case assumptions about the extent and type of contamination.

3.8.2 Emergency Decontamination of PPE

The designated SHSO/SS (or another authorized individual) assumes responsibility for addressing emergency decontamination within the site-specific Health and Safety Plan (HASP). Emergency decontamination may become necessary due to events such as fires, explosions, sudden violent storms, or medical emergencies. The emergency decontamination plan must clearly delineate emergency egress routes, as well as procedures for both decontamination and egress.

Some key points to consider regarding emergency decontamination.

- Immediate Notification: The SHSO/SS (or their designated counterpart) must be promptly informed of any circumstances requiring emergency decontamination. Additionally, they are accountable for tracking all personnel during the process.
- Urgent Medical Treatment: If urgent medical attention is necessary, decontamination of PPE may be delayed until the victim's condition stabilizes.
- Balancing Priorities: When feasible, decontamination should occur without hindering essential first aid. However, if a worker is exposed to an extremely toxic or corrosive substance, immediate decontamination is crucial to prevent severe injury or fatality.

- Heat-Related Illness: In cases of heat-related illness, protective clothing must be promptly removed (refer to Roux's Heat Illness Prevention Program).

Emergency Facilities:

- For workers potentially exposed to corrosive materials, quick drenching or flushing facilities must be provided in accordance with 29 CFR 1910.151(c) and 1926.50(g).
- Similarly, if workers face other hazards (such as splash or dust) that could harm the eyes or body, readily accessible wash stations are essential. These stations should be properly located and maintained, including regular water changes, as per the manufacturer's instructions.

3.8.3 Protection of Decontamination Line Assistants

Should work require a decontamination corridor the following shall be used as guidance. The SHSO/SS (or other designated person) must for ensuring that decontamination line assistants receive appropriate PPE and addressing their protection within the site-specific HASP. Key zones—namely, the Exclusion Zone (EZ), Contamination Reduction Zone (CRZ), and Clean Support Zone—must be clearly marked both in the field and within the site-specific HASP. The following should be considered when preparing for protection of decontamination line assistants.

1. Task Hazard Analysis: A thorough analysis must be conducted for line assistants to determine the optimal PPE level required. Factors influencing this decision include:
    - Expected or Visible Contamination on Responders
    - Type of Contaminant and associated respiratory and skin hazards
    - Total Vapor/Gas Concentrations in the CRZ
    - Presence of Particulates and specific inorganic or organic vapors in the CRZ
    - Results of Wipe Tests (refer to Section 5.4)
    - Slope and Configuration of the CRZ
2. PPE Levels: Depending on the situation:
    - Line assistants may need to wear the same PPE level as workers in the EZ.
    - Alternatively, line assistants may be adequately protected by using PPE one level lower (e.g., wearing Level C protection while decontaminating workers who are wearing Level B)."

3.8.4 Procedures to Minimize PPE Contamination

Proper work practices and procedures should be implemented at sites to minimize the potential for contact with chemicals of concern while onsite. The following guidance should be considered when developing site specific procedures:

- Opt for single-use Personal Protective Equipment (PPE) when feasible to minimize decontamination needs.
- Ensure complete sealing of PPE closures and interfaces, including pockets, zippers, and other potential openings.
- Position gloves and boots underneath the sleeves and pant legs of outerwear to reduce exposure.
- Place hoods outside the collar if they are not already attached.
- Utilize disposable outerwear and equipment when suitable to facilitate easy disposal and reduce decontamination efforts.
- Secure all junctions with tape to block contaminants from entering gloves, boots, jackets, and suits.

- Adopt work practices that limit contact with hazardous substances, such as avoiding unnecessary exposure.
- Employ remote techniques for sampling, handling, and opening containers, like using drum grapples and pneumatic impact wrenches.
- Store monitoring and sampling devices in bags designed with openings for sample ports and sensors.
- Cover contaminant sources with plastic sheeting or overpacks to shield PPE from contamination.

3.8.5 PPE Disposal

The PM in coordination with the field team shall ensure the safe disposal of all wastes generated from PPE use. PPE must be placed in appropriate containers, labeled, and prepared for disposal separately from other forms of waste. Refer to Roux's General Waste Corporate Management Program for further guidance.

APPENDIX A
EPA's
GUIDELINES TO ENSEMBLES FOR SPECIFIC ACTIVITIES/TASKS
WHERE CHEMICAL EXPOSURE IS POSSIBLE

GUIDELINES TO ENSEMBLES FOR SPECIFIC ACTIVITIES/TASKS
WHERE CHEMICAL EXPOSURE IS POSSIBLE

IMPORTANT: READ FOOTNOTES AND ASSUMPTIONS/JUSTIFICATIONS PRIOR TO USING TABLE

Notes:

1. This table is for use by trained environmental professionals only. To use this table:
   a. Scan the activity description to find activities (bolded) that most closely matches those you plan to engage in.
   b. Review Hazard/Conditions section to make sure the hazards of the planned activity match those listed. Note the Required Work Practices and be ready to follow them.
   c. For those activities most likely to be conducted as part the response, select Targeted Minimum PPE (Personal Protective Equipment).
   d. Necessary equipment needs to be available and used unless other information becomes available which necessitates an upgrade or allows a downgrade in the protection level. The work area must be continuously re-evaluated to ensure workers have the proper safety equipment.
   e. When working in hazardous environments, workers must always be aware of their surroundings. In addition to this Table, workers entering these environments need to use “common sense” prior to proceeding.
2. These ensembles focus on chemical protection and may not be adequate for all hazards. This Table can be used as a starting point but does not circumvent proper evaluation by an industrial hygienist in appropriate situations. See Table 2 for more specific chemical agents.
3. Suits, gloves, boots listed in the Minimum PPE column will not be appropriate for all activities, hazards and conditions. The listings should be used as a guide only. Confirm PPE compatibility with specific chemical contaminants.
4. A comprehensive Task Hazard Analysis must be performed prior to final selection of ensembles/PPE material types.
5. Hardhat (Class A or C), safety glasses/other eye protection are typically required but may not be specified here. In noisy environments (above 85dB) hearing protection is required. In areas where there is traffic, heavy machinery, or other hazards involving worker visibility problems a Class 2 High Visibility Vest must be worn. Activities requiring vests include natural disaster responses, demolitions, and excavations.
6. PPE makes and models referenced in these tables are only suggestions. Other comparable, adequate makes and models may be used.

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Emergency Response and/or Initial Entry/Assessment – Low Hazard Expected (Sites/Facilities): • Air and Radiation Monitoring Sweep • Visual Assessment • Note Taking • Photo-documentation	• Suspected low hazard based on site history/visual evidence. • No CBRN suspected. • No visible/suspected vapors. • No potential for IDLH atmosphere. • Unknown physical hazards. • Some site background information. • No intrusive work expected. • Low potential for chemical splash/contact (based on expected tasks/ known conditions). • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Level B** (Downgrade/upgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs) **Respirator: Scott or MSA Full Face** **Suit Type:** [I]Tychem CPF-3 (with boot, hood)/ChemTape **Inner Glove:** [II]Nitrile (6 mil min recommended) **Outer Glove:** [II]Neoprene, Nitrile, (28 mil min recommended) **Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or** **Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection. **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON**: Dry or soap & water

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Emergency Response and/or Initial Entry/Assessment of Unknown – Potential Moderate Hazard (Sites/Facilities): • Air and Radiation Monitoring Sweep • Visual Assessment • Note Taking • Photo-documentation	• Possible high hazard chemicals based on site history/visual evidence (spills, corrosion, industrial practices, etc.). • No CBRN suspected. • No visible/suspected vapors. • **No** reasonable potential for **IDLH** atmosphere. • Unknown physical hazards. • Little/ no site background information. • No intrusive work expected. • Low potential for chemical splash/contact. • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Level B** (Downgrade/upgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs) **Respirator: Scott or MSA Full Face** **Suit Type:** [I]Tychem Responder (with boot, hood)/ChemTape **Inner Glove:** [II]Nitrile (6 mil min recommended) **Outer Glove:** [II]Neoprene, Nitrile, (28 mil min recommended) **Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or** **Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection. **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON**: Dry or soap & water

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Emergency Response and/or Initial Entry/Assessment of Unknown - Suspected High Hazard (Sites/Facilities): • Air and Radiation Monitoring Sweep • Visual Assessment • Note Taking • Photo-documentation	• Potential for high hazard chemicals/ IDLH based on site history/visual evidence (visible/expected reactions, spills, vapors, fumes, smoke, known releases, etc.). • No CBRN suspected. • Potential for chemical reactions. • Unknown physical hazards. • Little/ no site background information or information suggesting high hazard. • Intrusive work possible. • Potential for chemical splash/contact. • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Level A** (Downgrade/upgrade (Trelleborg, etc.) based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs) **Respirator: Scott or MSA Full Face** **Suit Type:** Encapsulating [I]Tychem Responder/Responder CSM (with boot, hood, gloves)/ChemTape **Inner Glove:** [II]Nitrile (6 mil min recommended) **Outer Glove:** [II]Neoprene, Nitrile, (28 mil min recommended) **Outer Steel Toe/Steel Shank Boot:** [IV]Tingley HazProof Model 82330 and rely on suit boot material for permeation protection. (ASTM F-2413/ANSI Z41) **DECON**: Dry or soap & water: water source for emergency DECON; other DECON agents on hand.

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Drum/Tank Sampling • Container opening • Continuous air monitoring • Product sampling	• Unknown chemicals. • No CBRN. • Potential splash hazard. • Physical hazard controls in place. • Assumes no initial hazardous atmosphere. • Ensure availability of water source for emergency DECON/shower/eyewash. • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Level B** (Upgrade/Downgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs) **Respirator: Scott or MSA Full Face** **Suit Type:** [I]Tychem Responder (with boot, hood)/ChemTape **Inner Glove:** [II]Nitrile, Neoprene, Viton, PVC **Outer Glove:** [II]Heavy Duty Butyl, Nitrile, **Other:** ANSI Approved Splash Shield **Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or** **Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection. **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON or soap and water; water source for emergency DECON and eyewash suggested.

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Hazardous Categorization Testing (**HAZCAT**) • Opening sample containers in controlled environment • Working with small sample quantities in well ventilated area • Conducting HAZCAT testing with appropriate lab equipment	• Assumes known chemical classes and site situation/background. • No CBRN suspected. • Assumes immediate suit removal if contaminated and frequent glove changes. • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Level B** (Upgrade/Downgrade based on knowledge of contaminants and monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs) **Respirator: Scott or MSA Full Face** **Suit Type:** [I]Tychem CPF4 (with hood, boot) **Inner Glove:** [II]Nitrile **Outer Glove:** [II]Viton or 4-H (use surgie over the 4-H for dexterity) **Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or** **Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection. **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry or soap and water; water source for emergency DECON and eyewash suggested

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Oil Spill Response/Recovery Operations – Fresh Product: • Recovery operations (vac truck, skimmers, boom deployment where direct contact expected) • Product sampling • Continuous air monitoring at/near source of spill	• Crude oil/diesel/kerosene/gasoline spill. • Assumes fresh/ongoing spill, close proximity to source. • Assumes early phase while evaporation of light organics, benzene/other aromatics is still occurring (24-48 hours or if spill is on-going). • Assumes down-wind location. • Continuous air monitoring required for %LEL, Organics, $\%O_2$ (and H_2S as necessary for sour crude). • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Modified Level C:** 1/2 face respirator w/safety glasses/goggles as needed for splash protection. Downgrade as appropriate based on air monitoring. **Respirator: Scott or MSA ½ Face** **Respirator Cartridge:** [III] Multi-Phase Cartridge (Scott 642 Multi-purpose; MSA with/GME P-100 or equivalent). **Suit Type:** [I]Tychem CPF4 w/boot [jet fuel use Tychem BR] **Inner Glove:** [II]Neoprene (for protection at DECON line only, not for prolonged contact) **Outer Glove:** [II]Viton-Butyl Rubber (assumes potential for direct contact with fresh material – based on benzene/aromatic constituents) SEE NEXT ROW FOR WEATHERED PRODUCT. **Outer Steel Toe Boot:** [IV]Tingley HazProof Model 82330 **or** **Steel Toe Boot Cover**: [V]Latex HazMaster Booty and rely on suit boot material for permeation protection. **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON/ Soap and water as feasible

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Oil Spill Response Assessment/Recovery – Weathered Product • Shoreline clean-up assessment (SCAT) • Environmental sampling/weathered product sampling • Recovery Operations for weathered material • Assessment via boat/on or near water – use appropriate flotation device with ensemble.	• Crude oil/diesel/kerosene/gasoline spill. • Assumes weathered oil (over 24-48 hours, depending on spilled material and ambient temperatures). • Assumes operations are remote from source of spill. • Assumes no other potential for airborne aromatics/benzene/flammable vapors.	**Modified Level D** (Upgrade/Downgrade based on potential for contact and air monitoring with FID/PID, LEL/O_2 Meter. **If contact with material suspected, use following:** **Suit Type:** [I]Tychem F w/boot [jet fuel-Tychem BR] (Tychem SL may be an option for weathered crude/diesel – see manufacturer's information) **Inner Glove:** [II]Nitrile **Outer Glove:** [II]Nitrile (Best Nitri-solv 727) **Outer Boot Cover:** [V]Latex HazMaster Booty **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON/Soap and water as feasible

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Demolition/Excavation Operations: • Heavy equipment operation • Excavation/Trenching • Continuous air monitoring when soil is disturbed or demolition activities conducted. • Fuel Oil underground tank removal. • Drum Excavation activities EXCLUDED.	• Demolition activities generating potentially hazardous particulates (asbestos, lead, silica, etc.). • Excavation activities that could expose soil contaminated with low levels of known hazardous chemicals to the surrounding area /in the trench/ excavation. • No potential for IDLH atmosphere. • Site background information available. • Known physical hazards. • Workers will have minimal/ no contact with contaminants (i.e., operators in a cab, inspectors/ observers at a safe distance). • Continuous air monitoring required in trench for %LEL, Toxics, and $\%O_2$ when workers are in trench and for particulate when activities generating particulate are conducted. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Modified Level C:** 1/2 face respirator w/safety glasses. Downgrade or upgrade as appropriate based on air monitoring. **Respirator: Scott or MSA ½ Face** **Respirator Cartridge:** [III] Multi-Phase Cartridge (Scott 642 Multi-purpose P-100; MSA with/GME P-100 or equivalent). **Suit Type:** [I]Proshield Next Gen **Inner Glove:** NA **Outer Glove:** Leather **Outer Steel Toe Boot: NA** **Steel Toe Boot Cover**: [V]Latex HazMaster Booty (if chemical in soil is possible) **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON/ Soap and water as feasible

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Natural Disaster Response (Hurricane, Tornado, Flood, Earthquake) - Orphan Container Recovery: • Routine hand collection/pick-up of small containers from debris piles/lines • Land based operations - conducted on foot **Note:** Physical Hazards may necessitate PPE modifications.	• Unknown materials – confident identification based on visual observations. • **Required Work practice:** re-evaluate prior to moving suspicious containers. Air monitoring and PPE upgrade may be required. • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Modified Level D:** Upgrade/downgrade based on suspicious containers (not easily identified visually) and air monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs **Suit Type:** [I]Tychem CPF-3 w/boot **Inner Glove:** [II]Nitrile **Outer Glove:** [II]Nitrile (Best Nitri-solv 727) or Leather **Outer Boot Cover:** [V]Latex HazMaster Booty **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON/Soap and water as feasible
Natural Disaster Response (Hurricane, Tornado, Flood, Earthquake) - Orphan Container Recovery: • Routine Drum recovery from debris lines/piles/ other – conducted on land **Note:** Physical Hazards may necessitate PPE modifications.	• Unknown materials – confident identification based on visual observations. • **Required Work practice:** re-evaluate prior to moving suspicious containers. Air monitoring and PPE upgrade may be required. • **Required Work Practice:** Immediate PPE Change-out (i.e., gloves, etc.) upon contact with chemicals. • **Required Work Practice:** Must follow standard air monitoring protocol.	**Modified Level D:** Upgrade/downgrade based on suspicious containers (not easily identified visually) and air monitoring with PID/FID, radiation detector, LEL/O_2 per HASP/ SOSGs **Suit Type:** [I]Tychem CPF-3 w/boot **Inner Glove:** [II]Nitrile **Outer Glove:** [II]Nitrile (Best Nitri-solv 727) or Leather **Outer Boot Cover** [V]Latex HazMaster Booty **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON/Soap and water as feasible

Activity Description	Hazards/Conditions	Targeted Minimum PPE
Natural Disaster Response (Hurricane, Tornado, Flood, Earthquake) – Flood water sampling: • Water Sampling of flood waters where potential for contact with hands/feet is high **Note:** Physical Hazards may necessitate PPE modifications.	• Unknown contaminants • Potential for pathogens suspected • Low potential for acute exposure to hazardous chemicals • Assumes open air/well ventilated areas **Required Work Practice:** Monitor all poorly ventilated areas in appropriate PPE/Respiratory Protection for organic vapors (PID & FID), %LEL/flammable atmospheres, H_2S prior to entry	**Modified Level D:** Upgrade based on more information as it becomes available. **Suit Type:** [I]Proshield Next Gen **Inner Glove:** [II]Nitrile **Outer Glove:** [II]Nitrile (Best Nitri-solv 727) **Outer Boot**: Waders (butyl, neoprene) as needed. **Steel Toe/Steel Shank Boots:** ASTM F-2413/ANSI Z41 **DECON:** Dry DECON/Soap and water as feasible
Environmental Sampling (Low Concentration Water/Soil/Perimeter Air): • Multi-media Sampling • Documentation (written/photo) • Inspection of clean-up operations	• Known Chemical Contaminants. • Airborne concentrations well below PELs. • Minimal chance of skin exposure to chemicals. • Insects possible.	**Level D:** Upgrade based on more information as it becomes available. **Suit Type:** [I]Proshield 1 (if ticks, etc. maybe a problem) **Inner Glove:** [II]Nitrile **Outer Glove:** NA **Outer Boot:** NA **Steel Toe Boots:** ASTM F-2413/ANSI Z41 **DECON:** NA

i. Tychem and Proshield suits can be purchased from Safeware: 800-331-6707, http://www.safewareinc.com , (see also LSS, http://www.labsafety.com, Dupont: 1-800-931-3456, http://www2.dupont.com/Personal_Protection/en_US/index.html)

ii. Nitrile Inner/Outer Gloves; Viton; Butyl Rubber; 4-H (polymeric) can be purchased from Safeware: 800-331-6707, http://ww.safewareinc.com ; Airgas: 1-866-718-0685, http://www.airgas.com (see also North Safety, http://www.northsafety.com); Best Gloves, http://www.bestglove.com ; Lab Safety Supply (LSS), http://www.labsafety.com; Airbill, http://www.airbill.com)

iii. Multi-Phase Cartridge (Scott 642 Multi-purpose; MSA with/GME P-100 or equivalent) can be purchased from LSS: 1-800-356-0673, http://www.labsafety.com (see also Safeware, http://www.safewareinc.com; Scott Safety, http://www.scotthealthsafety.com/; MSA, http://www.msanet.com/)

iv. Tingley HazProof Overboots or similar can be purchased from LSS: 1-800-356-0673, http://www.labsafety.com; National Safety, Inc.: 1-800-213-7092, http://www.nationalsafetyinc.com

v. Latex Hazmaster Booties, Nuke Boot or similar can be purchased from Safeware: 800-331-6707, http://www.safewareinc.com; Airbill: 1-215-632-2000, http://www.airbill.com; (see also Airgas, http://www.airgas.com; LSS, http://www.labsafety.com

APPENDIX E

Subsurface Utility Clearance Management Program

SUBSURFACE UTILITY CLEARANCE MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY DIRECTOR	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**01/2019**
REVIEW DATE	:	**03/2024**
REVISION NUMBER	:	**4**

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APPENDICES

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. For the purpose of this program, a structure is defined as any underground feature that may present a 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.

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. Intrusive work activities can include, but are not limited to, digging or scraping the ground 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 concrete slabs on grade.

Deviation from the program, regardless of the specific work activity or location, must be pre-approved based on the client's site knowledge, experience, site conditions, and additional documentation on the site. Any exceptions shall be documented through the Roux Subsurface Utility Clearance Variance Form located within the Roux Health & Safety Online Application or through OKTA. Approval is required by the Project Principal (PP) and the Operations Manager (OM) in consultation with the Office Health and Safety Manager (OHSM) or Corporate Health and Safety Director (CHSD) prior to mobilization. Depending on the work location, more stringent federal, state, local, or client requirements may apply. It is the responsibility of the Project Team to identify such requirements prior to mobilization.

3. PROCEDURES

3.1 Before Intrusive Activities/Job Planning Process

Prior to intrusive work at a site, the Project Manager (PM) shall ensure that the notification of the State One Call or equivalent service (Nationwide-811) is completed a minimum of 48-72 hours (One-Call State Law Directory) before intrusive work activities (this timeline excludes Saturdays, Sundays, Legal Holidays and 811 observed holidays). This notification is required by law for all states. State-specific/local laws related to utility location may vary. The project team is responsible for understanding requirements that may affect their work site.

Obtain, review, and field verify relevant historical site data that may include: as-builts/site plans; easement/right-of-way information; historical aerial photos/development plans; local/state permitting records; previous site investigation/boring logs; and/or interviews with site representative/client. Interviews with site or client personnel should ask the following:

- Employee(s) Name and Relationship with the site;
- Types of utilities, including structure and location of utilities on-site;
- Depth of known utilities; and

- Any other relevant information as it pertains to the site.

Prior to intrusive work activities, information pertaining to the site should be included in Roux's Subsurface Utility Clearance Checklist and Utility Verification/Site Walkthrough forms. This form is located within the Roux Health & Safety Online Application or through OKTA.

If there is the potential for unexploded ordinances or munitions, consultation with your OM and CHSD is required prior to site operations.

3.1.1 Project Kick-Off Meeting

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

- Confirm that the State One Call or equivalent is received and that the ticket number is confirmed, reviewed, and valid for the time of work. If intrusive work activities are not conducted during this valid time period, the One Call ticket must be renewed, and the site must be remarked;
- Review the work scope to be performed with the site owner/tenant to determine if it may impact any utilities;
- 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 / (e.g., Radio Frequency Detection, Electromagnetic Induction), Ground Penetrating Radar (GPR) , and other applicable geophysical inspection services. The use of private utility locating firms, however, does not eliminate the legal requirement for the subcontractor (e.g., driller, excavation 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, below-reinforced slabs, etc. They should not be relied upon as the only means of performing utility clearance;
    - A mark-out is defined as 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 identified utilities 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, soft Digging must completed prior to intrusive work. Section 3.4 Preferred Methods of Clearing the Subsurface (Pre-Clearing) outlines requirements for pre-clearing techniques in order of preference.
- Documented description of the dig site, which is included in the project's 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 Utility Mark Out

- 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. Ensure ticket life is still valid for work.

  - 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, local transportation departments, and railroad operators. In the event the Project Teams anticipate subsurface work will impact public utilities, railroad operations, or public roadways, coordination with the utility owners/operators is required.

- Have written confirmation prior to mobilizing to the site that the Project Team 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 utility mark-outs have 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 the utility locators have located said utilities.

  (Note: The Tolerance Zone is defined as three feet from the outside edge of any subsurface structure.)
- For non-subscribing utility owners or if public one-call service is not available, perform due diligence and request further information regarding utility type, construction details, location, and burial depth directly from public service providers/utility owners. Request utility mark-out by each public service provider/utility owner as applicable. Confirm contact and response by each public utility owner on the Subsurface Utility Clearance Checklist.
- If utilizing a Private Mark out, ensure the contractor has a plan regarding what types of technology will be used based on Table 1 in Appendix B: Private Utility Technology Applications and Considerations. If possible, it is recommended that multiple technologies be used to sweep each location/work area. Use a tracer wire to locate the utility (when tracer wires are present). Record the results of the private utility mark-out on the Utility Verification/Site Walkthrough Record form.

3.3 Site Visit/Utility Walkthrough

Before mobilization with the subcontractor or during the pre-work safety tailgate with the subcontractor, perform a site walkthrough after utility mark-outs have been completed to determine whether additional potential hazards are present and look for visible signs of utilities that may be present. Outlined below are considerations regarding a site walk before intrusive activities. Before initiating any intrusive work, verify that the utilities marked on-site align with the information provided in the One Call response notification/ticket and with site plans and documents. If any discrepancies arise, address them promptly to ensure accuracy and do not start intrusive work until they are rectified.

- Identify overhead utilities that may impede equipment mobilization or work zones to ensure adequate Occupational Safety and Health Administration (OSHA) clearance distance(s), as specified within the site-specific Health and Safety Plan (HASP) and 29 CFR 1926.1408 Table A.

The presence of any of the following may indicate potential subsurface structures:

- Locations of buildings, equipment, and features like area lights, signs, sprinkler systems, phones, drains, natural gas meters, manholes, etc.;
- Warning tape, which is often a sign of underground services;
- Material like pea gravel, sand, or other non-native materials can indicate the presence of tanks or lines or any deviations from the established native soil or backfill conditions;

- Red concrete, which is often used for electrical duct banks;
- Evidence of damaged utilities, such as piping materials, insulation, or odors present in the work area; and
- Other utilities, including fire hydrants, electrical transformers, pipeline markers, valve covers, steam lines, valve box covers, clean-outs, etc.

By observing the path between the main service line and the connection point (e.g., a utility meter at the exterior of the site building), it may be possible to determine the likely routing of on-site utilities. However, this method should not be relied upon solely, and proper risk mitigation strategies should be in place before proceeding with any ground disturbance activities. Look outside your work zone for other potential utilities that may cross through your work zone.

For sites with potential underground storage tanks present (UST), the following guidance applies:

- Identify if the product piping is either rigid or flexible.
- Conduct a visual examination of the tank field, observation wells, dispensers, vent stacks, and UST fill points to determine their location.
- Locate and become familiar with the emergency shutoff button/switch, if present.
- Determine the orientation, arrangement, and location of the tanks, as well as their size and capacity, through the examination of visible features at grade, such as fill ports and extractor covers, and by consulting any available as-built drawings.

Before commencing any subsurface intrusive work, field staff should thoroughly address any discrepancies in utility company mark-outs or the absence of mark-outs.

3.3.1 Project Management-Field Personnel

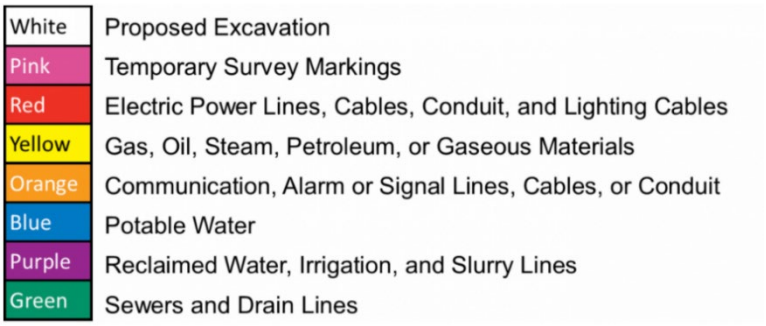
Whenever possible, it is advisable to assign the same project personnel to both utility location and clearance tasks as well as intrusive activities. This continuity ensures that site knowledge and utility information gathered during the clearance phase remain up-to-date. Having this historical perspective helps minimize the risk potential of utility strikes.

In cases where maintaining the same personnel throughout the project isn't feasible, a thorough knowledge transfer regarding site utilities, locations, clearance results, and proposed intrusive activities becomes essential. The PM must ensure that there is a successful handoff of information when there is a change in field personnel.

3.3.2 Utility Markings

The utility marking color code includes various uniform colors. The following APWA uniform color code (ANSI Z535.1) is provided below. While certain government agencies or large industrial facilities may use additional colors, Roux's policy is to consider any unlisted paint marking or pin flag color as a subsurface utility marking unless proven otherwise.

If utilities or subsurface anomalies are identified but their type or classification remains uncertain, it is advised to employ pink paint or pin flag (Temporary Survey Marking) for marking. Once the utility type is definitively established, the pink marks should be updated to accurately represent the correct type of utility.

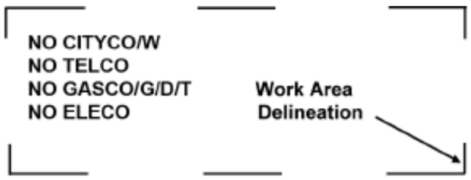


Understanding the markings left by locators during the 811 process is crucial for avoiding utility-related issues. Typically, these markings are done when Roux staff members are not physically present on-site. To enhance understanding/accuracy, it is advisable for staff to be present during the 811 process or engage in conversations with locators, both public and private, while on-site. Additionally, utility marks must adhere to the proper standards outlined in the Uniform Color Code.

Common Abbreviations

Source: Common Ground Alliance

Facility Identifier		**Underground Construction Descriptions**		**Infrastructure Materials**	
CH	Chemical	C	Conduit	ABS	Acrylonitrile - Butadiene - Styrene
E	Electric	CDR	Corridor	ACP	Asbestos Cement Pipe
FO	Fiber Optic	D	Distribution Facility	CL	Cast Iron
G	Gas	DB	Direct Buried	CMC	Cement Mortar Coated
LPG	Liquefied Petroleum	DE	Dead End	CML	Cement Mortar Lined
PP	Petroleum Products	JT	Joint Trench	CPP	Corrugated Plastic Pipe
RR	Railroad Signal	HP	High Pressure	CMP	Corrugated Metal Pipe
S	Sewer	HH	Hand Hole	CU	Copper
SD	Storm Drain	MH	Manhole	CWD	Creosote Wood Duct
SS	Storm Sewer	PB	Pull Box	HDPE	High Density Polyethylene
SL	Street Lighting	R	Radius	MTD	Multiple Tile Duct
STM	Steam	STR	Structure (vaults, junction inlets, lift station)	PLA	Plastic (conduit or pipe)
SP	Slurry System	T	Transmission Facility	RCB	Reinforced Concrete Box
TEL	Telephone			RCP	Reinforced Concrete Pipe
TS	Traffic Signal			RF	Reinforced Fiberglass
TV	Television			SCCP	Steel Cylinder Concrete Pipe
W	Water			STL	Steel
W	Reclaimed Water "Purple"			VCP	Vertrified Clay Pipe



3.4 Preferred Methods of Clearing the Subsurface (Pre-Clearing)

At least one of the methods listed below shall be carried out during pre-clearing activities. The Project Team is responsible for evaluating risks associated with the Scope of Work to determine which method is selected. If none of the following pre-clearing activities are performed, a Subsurface Utility Clearance Variance must be submitted to the OM. This Subsurface Utility Clearance Variance must provide clear lines of evidence that there are no utilities present within the intrusive work zone. Examples include demolition permits of the site, utility closure documents indicating no live utilities on-site, as-builts, site history, etc.

The following approaches shall be considered and implemented based on the Scope of Work.

- ***Soft Digging***
  - This is the preferred method of utility clearance when clearing higher-risk utilities. Soil should be cleared through the use of a vacuum truck/equivalent, an accompanying air knife (preferred), or a water lance to break up and loosen the soil for removal with the vacuum.
- ***Hand Digging***
  - Soil should be broken up and removed using a shovel or other appropriate hand tools without excessive force. Limit the use of dig bars or other tools that, if used incorrectly, can significantly damage utilities.
- ***Hand Augering***
  - The hand auger must be turned slowly using even hand pressure without excessive force. Rounded edge augers are preferred. Hand augers should not be used in pea stone/pea gravel where utilities may be present and could potentially be damaged by the hand auger. The abrupt absence of soil recovery in a hand auger could indicate utilities as pea gravel or sand may have spilled out of the auger (exception: native soil conditions that typically result in poor hand auger recoveries). If any resistance is encountered while operating the hand auger for pre-clearance, the equipment will be removed, and the exploratory test hole will be visually inspected by onsite personnel for any obstructions or indications of subsurface structures.

3.4.1 Guidance for Tools and Equipment

Personnel performing pre-clearance activities shall keep tools and equipment in safe working order and be properly inspected before use. If tools or equipment are broken, they will be tagged and removed from service. The following specify additional guidelines regarding tools and equipment:

- Hand-digging tools must have a non-conductive handle, such as fiberglass, wood, or composite, or fully insulated handles and potential contact surfaces.
- Blades on shovels and post-hole diggers should have rounded or blunt edges.
- Pick axes or pointed spades should not be used for physical clearance.
- Crowbars, pinch-bars, or pry bars should not be used to break hardened soil or backfill except when authorized by the Site Supervisor (SS). This should only be used to loosen materials like bricks or larger stones.

- Electric-powered equipment must have ground fault protection.
- Should there be refusal or difficulty with advancing hand tools, the contractor shall stop work and notify the Roux SS or Site Health and Safety Officer (SHSO) immediately.

3.5 During Intrusive Activities

3.5.1 Concrete/Paving Surface Removal

Remove any surface coverings (i.e., pavement, brush, debris, etc.) to ensure workers have clear visibility of the work area and subsurface conditions. Avoid mechanical jackhammering over known lines unless they are de-energized, locked-out/tagged-out, and potential repairs are planned or if the utility has been completely disconnected prior. When cutting or coring, go only as far as needed to penetrate the surface cover. When removing a large surface area, begin at the perimeter of the removal zone. This initial step helps identify any utilities passing through the work zone. For extensive areas, using a concrete saw might not be practical. Instead, heavy equipment is often employed. During this process, a designated spotter should guide the heavy equipment. Their role is to watch for warning signs of utilities. It's crucial that the heavy equipment does not have "teeth" that could potentially pass through the surface and damage utilities.

3.5.2 Pre-Clearance Procedures

Install pre-clearance exploratory test holes using one of the techniques, as outlined in Section 3.4, for the first 5-ft below land surface (BLS) at each location before conducting intrusive mechanized activities. Should utilities be located at a greater depth than 5-ft BLS consult with the OM, OHSM and CHSD regarding adjustments to the pre-clearance requirements to go greater than 5-ft BLS. Some Clients may require greater than 5-ft BLS for pre-clearance test holes; Project teams should be aware of such Client requirements prior to work.

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 the PM and PP to evaluate alternative approaches for the project. Alternative approaches will need to be pre-approved by the OM through a Subsurface Utility Clearance Variance.

Both single-point and three-point clearance are acceptable as long as the following criteria are met below. For single-point clearance, the exploratory test hole is advanced at the exact location of the proposed borehole. If three-point clearance is performed, it must be done in a triangular pattern around the proposed borehole and in a configuration that would not allow utilities to enter the borehole.

- The size of the pre-clearance exploratory test hole should be, at a minimum, twice the diameter of any downhole tool or boring device.
- For direct push applications (CPT, Geoprobe®, etc.), the borehole clearance diameter shall be at least 125% of the diameter of the largest tool being pushed through the subsurface (e.g., tip, rod, sampler, etc.), to the minimum required depth.
- For excavations, all utilities need to be marked and then exposed by soft-digging or 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 pre-clearance test holes specified in Section 3.4 to expose the utility. Once structures have been verified, a minimum clearance of three feet must be maintained between the utility and any powered equipment. If considered a high-risk utility, additional requirements may be necessary and required by the Operator of the utility. Consultation with the OM and CHSD may be appropriate.

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

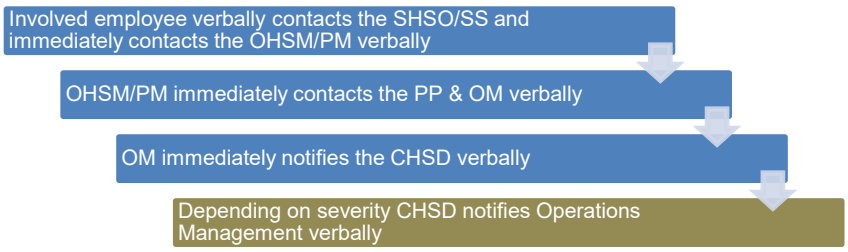
- Ensure the mark-out remains valid. (In certain states, there are limits regarding the duration of time after the mark-out was applied to the ground surface work can be started or interrupted.) Additionally, the mark-outs must be maintained, documented, and in many cases, refreshed periodically to be 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 the 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 and subsurface utility clearance are performed.
- Halt the intrusive activities and immediately consult with the PP if an unmarked utility is encountered.
- Complete any loss reports associated with subsurface utility strikes as necessary.
- If a utility cannot be found as marked, Roux personnel shall notify the facility owner/operator directly or through the one-call center. If the facility operator is not responsive, then the one-call center must be notified. Following notification, the excavation/mechanical intrusive work 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. State law dictates ticket life. Project teams must be aware of their state-specific requirements.

3.6 Stop Work Authority

Each Roux employee has Stop Work Authority that 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 in consultation with the OHSM after such action is reviewed and resolved. The PM will initiate and execute all management notifications and contact emergency facilities and personnel when this action is appropriate.

3.7 Reporting Utility Incidents

Roux field personnel engaged in any utility strike (e.g., subsurface/aboveground) must promptly stop work, shutdown any equipment and get to a safe location at the Site. Then notify the PM to discuss the incident. In case of injuries, field personnel must call 911 or the local emergency services number and then inform the PM. Additional notifications shall follow Roux's Incident Notification Process. Depending on the utility strike additional notifications shall be made to utility operators and/or clients/site contacts.



Appendix A
Roux Subsurface Utility Clearance Checklist

Appendix A

Roux Subsurface Utility Clearance Checklist/Utility Verification/Site Walkthrough Record

Roux Subsurface Utility Clearance Checklist ***Date of Revision: 3/2024***

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 (if applicable).				
HASP is available and reviewed by site workers / visitors.				
Subsurface Utility Clearance Procedure has been reviewed with all site workers.				
Mechanical intrusive work activities may not be performed at any location without authorization from the Roux Site Supervisor (SS). Clearance activities may not be performed at any location unless the SS is physically present.				
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. Intrusive work activities cannot be performed in areas that are in direct conflict with any markings made by public or private locators.				
Unless the PP & OM authorizes it, all boreholes and test pit locations must be physically cleared before using mechanized equipment. Required minimum physical clearance depths and diameters are as follows: • Physically clear to a depth of 5 feet bls. • The size of the pre-clearance exploratory test hole must be, at a minimum, twice the diameter of any downhole tool or boring device. • For direct push applications (CPT, Geoprobe®, etc.) the borehole clearance diameter shall be at least 125% to the diameter of the largest tool being pushed through the subsurface (e.g., tip, rod, sampler, etc.).				
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).				

Mechanical intrusive work is prohibited within 3-feet distance in all directions from subsurface structures that will be intentionally exposed during pre-clearance. Any removal of material within 3-feet of the subsurface structure may only proceed by hand using non-conductive tools/compressed air if authorized by state law and the owner/operator of the utility.				
All equipment onsite must maintain the appropriate horizontal distance from any point on the equipment to the nearest overhead electrical power line. Refer to site-specific HASP and local/utility company requirements.				
Verbal endorsement received from Roux PM and OM 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 relied upon solely.

- The size of the pre-clearance exploratory test hole must be at a minimum twice the diameter of any downhole tool or boring device to minimum required depth of 5 feet bls.
- For direct push applications (CPT, Geoprobe®, etc.) the borehole clearance diameter shall be at least 125% of the diameter of the largest tool being pushed through the subsurface (e.g., tip, rod, sampler, etc.), to the minimum required depth of 5 feet bls.
- The tolerance zone is defined as three 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 three feet from the outside of any subsurface structure.
- 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 three feet must be maintained between the utility and any powered equipment.

Utility Verification/Site Walkthrough Record

Employee Name:_____

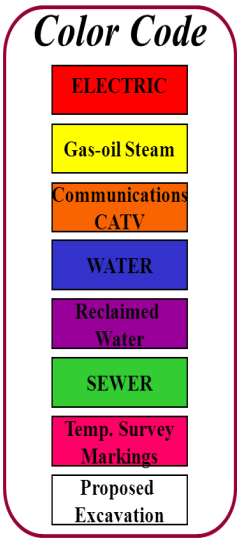
Date: _____

Instructions: For each utility suspected at the job site, indicate the 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:



Other Comments / Findings:

Completed by: _____

Signature: _____ Date: _____

Appendix B
Private Utility Technology Applications and Considerations

Appendix B – Private Utility Technology Applications and Considerations

Technology ⇒ Utility/Object ⇓	Radio Frequency Electro-Magnetic Detector (connection to utility, or induction without connection)	Radio Frequency Electro-Magnetic Detector (passive sweep)	Ground Penetrating Radar (GPR)⊙	Acoustic Plastic Pipe Locator	Beacon, Sonde or Conductive Rodder Insertion	EM-61 (time domain electromagnetics) Ξ	
Power/Instrument Line (Energized/Signaled) □	❋ G	G	G	R	R	G	
Power Line (Non-energized) □	❋ G	R	G	R	R	G	
Sewer/Water Line (Metallic) □	❋ G	Y	G	Y	G	G	
Sewer/Water Line (Non-metallic)	R	R	G	G	❋ G	R	
Instrument / Telecomm Lines (Non-energized)	❋ G	R	G	R	R	Y Only if metallic	
Hydrocarbon Transmission Line (Pipeline)◆ □	❋ G	R	G	R	R	G	
Metallic/Non-Metallic Line (with Tracer Wire)	❋ G	Y	G	Y	Y	G metallic	Y non-metallic
Metallic/Non-Metallic Line (without Tracer Wire)	G metallic	R non-metallic	R	❋ G	Y	Y	G metallic	R non-metallic
Metal or Fiberglass UST	R	R	❋ G	R	R	G metallic	R non-metallic

Additional Considerations

Technology ⇒ Variable ⇓	Radio Frequency Electro-Magnetic Detector	Ground Penetrating Radar (GPR)⊙	Acoustic Pipe Locator	Beacon, Sonde, or Conductive Rodder Insertion	EM-61 Ξ
Moist Soil	G	Y	G	G	G
Dry Soil	Y	G	Y	G	G
Clay	Y	R	G	G	G
Concrete w/Rebar	R	Y	G	G	R
Long Horizontal Profile	G	G	G	G	G
Short Horizontal but Deep Vertical Profile	Y	G	R	R	G
Access to Line✚	G	N/A	G	G	G
No Access to Line✚	G (induction or passive)	G	R	R	G
	R (direct connect)				G
Ferrous Metal	G	G	G	G	G
Non-ferrous Metal	Y	G	G	G	G
Adjacent or crossing conductive utility(ies)	Y	N/A	N/A	N/A	Y

Each site will be unique. Do not use this table as the sole criteria for technology selection. Use it as a starting point to assess available, applicable technology(s).

❋ Indicates best technology for given object. Site structures, rebar in concrete, shallow groundwater tables, perched storm water, etc. can significantly affect performance and reliability of any electro/magnetic method. Other utilities which cross or are adjacent to the target line can cause the EM signal to bleed or jump to the other utility line.

□ Metallic lines that have power running through them or can be connected to a tracer signal generator.

◆ Natural gas pipeline locating technicians must be trained/certified (in the U.S. requires DOT and Office of Pipeline Safety standards, other regions may have similar certification or requirements).

⊙ Most sensitive to interpretation. The skill, training and experience of operator are critical.

Ξ Emerging technology with limited availability.

✚ Access: induce unique electronic signature, apply acoustical impulse or insert conductive rodder/beacon/sonde.

Green Generally, an applicable technology **Yellow** May or may not be applicable **Red** Not generally applicable

APPENDIX F

Heavy Equipment Exclusion Zone Policy

HEAVY EQUIPMENT EXCLUSION ZONE MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY DIRECTOR	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**01/2019**
REVIEWED DATE	:	**03/2024**
REVISION NUMBER	:	**3**

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1. PURPOSE

The Exclusion Zone Management Program aims 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 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 performing fieldwork and are potentially exposed to heavy equipment. 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, 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 personnel required to work near the equipment. The exclusion zone is in effect when heavy equipment is moving or engaged (e.g., 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 fall zone of equipment and their contents; and
   - Greater than the tip-over distance of the heavy equipment.

   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 Planning Process and incorporated in the pre-job tailgate meeting with the subcontractor(s), including any updates to our Job Safety Analysis (JSA).

2. The spotter (or another authorized individual) is responsible for enforcing the Exclusion Zone and not conducting any other task. 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 their line of sight. If a spotter must be within the Exclusion Zone, they must be in a designated area outside the swing/tip radius, fall zone, line of fire of lifted loads, etc. If multiple pieces of equipment are being used, one spotter may be adequate so long as there is a clear line of sight and the spotter can control the zone(s). Radios would be required since hand signals would not be adequate if two pieces of equipment are in operation at the same time in the Exclusion Zone.

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 (e.g., 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 bring the boom/arm to the ground ensuring a “Zero Energy State” and DISENGAGE THE CONTROLS and STOP and SIGNAL BY “SHOWING HIS HANDS.” This signal will indicate that it is safe for the person to enter the limits of the Exclusion Zone to perform the required activity. The equipment must remain completely stopped/disengaged until all personnel exited the Exclusion Zone's boundaries 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 free of Slip/Trip/Fall hazards.
5. The Exclusion Zone should be delineated using cones with orange snow fences 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 fences, should be used. For certain types of widespread or moving/mobile equipment operations, such delineation may not be practicable around 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 the 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. Logistics involving heavy equipment should be understood and discussed prior to the field event during the job planning phase.

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, emphasizing 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 (PP), Office Health and Safety Manager (OHSM) 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. However, all Roux employees are provided initial training, as well as annually thereafter, on our Heavy Equipment Exclusion zone policy.

5. STOP WORK AUTHORITY

All Roux employees and their subcontractors have stop-work authority. Upon initial hire, all Roux employees are provided initial safety orientation, including stop work authority. All Roux employees and subcontractors are encouraged to stop work whenever any task or operation presents unreasonable risk or employees are

unsure how to carry out work safely. This includes upon observing any questionable safety-related behavior or condition, they are to stop work immediately and discuss the behavior or condition with the individual(s) involved. Upon stopping work, the following actions will be taken:

- Notify the affected parties to include the Project Manager (PM) and Site Health and Safety Officer (SHSO);
- Work to correct the situation or not proceed until the situation is corrected by the PM or SHSO;
- Resume work only when told to proceed by either the PM or SHSO;
- The SHSO will document the Stop-Work intervention in the field logbook;
- Stop-Work interventions will be reported to the PP for review to ensure the interventions are closed; and
- The PP will share learnings from the interventions, as appropriate, throughout the firm, to demonstrate the importance of the Stop-Work interventions.

Please note: Any form of retribution or intimidation directed at any individual or company for exercising their right to issue a stop work authority will not be tolerated.

APPENDIX G

Incident Investigation and Reporting Management Program

INCIDENT INVESTIGATION AND REPORTING MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY DIRECTOR	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**01/2019**
REVIEW DATE	:	**03/2024**
REVISION NUMBER	:	**5**

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APPENDICES

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 are 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's EHS performance.

2. SCOPE AND APPLICABILITY

These procedures apply to all Roux employees. Employees must 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. All work-related fatalities, injuries, and/or illnesses shall be recorded, and written records are kept in accordance with 29 CFR 1904. OSHA 300 Log, privacy case list (if applicable), annual summary reports, and OSHA incident report forms shall be maintained for a minimum of five (5) years following the end of the calendar year.

3. RESPONSIBILITIES

All Roux employees are responsible for reporting all incidents as soon as possible to the PM (or Administrative Manager for office-related incidents), Site Health and Safety Officer (SHSO), Office Health and Safety Manager (OHSM), Corporate Health and Safety Director (CHSD), and Operations Manager (OM), regardless of severity. Additionally, the following positions have specific responsibilities for implementing this specific SOP.

3.1 Corporate Health and Safety Director (CHSD)

- The CHSD is responsible for ensuring a system is in place for reporting, investigating, correcting, and communicating EHS incidents and near losses. This responsibility includes providing appropriate training in Root Cause Analysis. All field personnel and their supervisors and managers shall be trained accordingly.
- The CHSD is responsible for ensuring workplace fatalities are reported to OSHA within 8 hours, and any in-patient hospitalization, amputation, or eye loss must be reported to OSHA within 24 hours. Additionally, required incidents will be reported to the client (host facility) within 24 hours, if applicable.
- The CHSD is responsible for implementing and communicating this program's contents to OHSMs.
- The CHSD will review all incidents and corrective actions taken. The CHSD will summarize serious incidents to the Board of Directors.
- The CHSD will communicate learnings from incidents and corrective actions taken to all personnel through quarterly communications.
- The CHSD will periodically review and evaluate the effectiveness of this procedure.
- The CHSD shall coordinate updates to OSHA 300 logs within seven calendar days of receiving information that an OSHA recordable injury occurred.

3.2 Chief Executive Officer (CEO)

- The CEO (Company Official) is responsible for signing off on the OSHA 300A Summary form provided by the CHSD.

3.3 Operations Manager (OM)

- The OM will designate the individual to serve as the OHSM responsible 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 review all incident reports prepared under this procedure.

3.4 Office Health and Safety Manager (OHSM)

- The OHSM is responsible for reviewing draft incident reports, assisting the OM in finalizing reports of all accidents, illnesses, and incidents related to work activity, and assisting the SHSO when necessary.
- The OHSM is responsible for determining root causes of all loss incidents and any near loss incident which could have resulted in a serious injury or fatality and/or significant property damage.
- The OHSM may not approve a site-specific Health and Safety Plan (HASP) unless the HASP includes incident reporting procedures and forms, as applicable.
- 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 documents to the CHSD within one week of the incident. If a serious incident occurs, the CHSD will be notified as soon as possible.
- The OHSM shall post the annual OSHA 300A summary within a common space (i.e., kitchen, break area) within the office visible to all employees from February 1st through April 30th.
- The occurrence of a serious incident will trigger an health and safety audit by the OHSM.

3.5 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, which are available digitally on Roux's Health and Safety App Gateway and online.
- 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 assist in determining the root cause of the incident with the assistance of the SHSO and OHSM. The PM should provide input as to corrective preventative measures.

3.6 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 the Roux Legal Department and Accounting.

- It is the SHSO's responsibility to immediately notify the OHSM and the PM when any incident occurs. Such notification should occur 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 corrective actions proposed by the OHSM or OM are carried out.

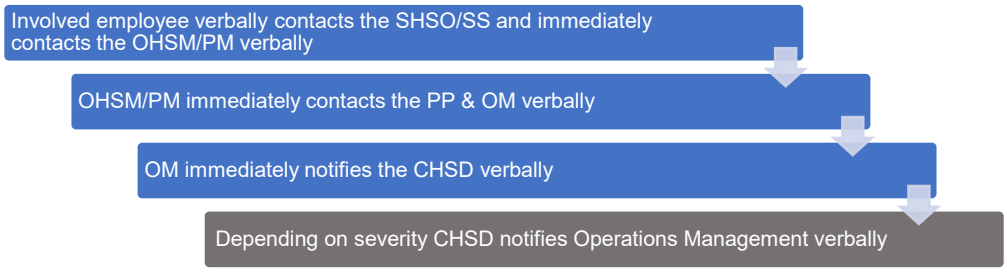
3.7 All Personnel

- All personnel are responsible for reporting and describing the details of any incident they are involved to the SHSO and PM. Such notification should occur immediately following the completion of any emergency actions required by the HASP, after the loss, and before the scene is disturbed or vehicles are moved.

4. PROCEDURE

4.1 Emergency Medical Treatment and First Aid

In the event of a work-related injury or illness, employees must follow the procedures outlined below. All workplace 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, is initiated, as necessary. The Injury/Illness Notification Flowchart is provided below.



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

- 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, immediately following the notifications provided above.
- Based on discussions with the Project Team, Corporate Management, and the Occupational Health Care Management Provide, 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.
- Decontaminate to the extent possible prior to administration of first aid or movement to medical or emergency facilities.
- 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).
- The SHSO and PM will perform a Loss Investigation (LI), and the Project Team will complete the final Loss Report. As outlined below.

4.2 Incident Investigation

Upon receiving a report of an incident or near loss occurrence from a Roux employee, the SHSO or OHSM shall immediately investigate the circumstances and make appropriate recommendations to prevent a recurrence. All reports are filed digitally within Roux's Health and Safety Management System. Should hard copies be requested the Health and Safety Department may provide Roux's Incident Report form which can be found in **Appendix A**, and Near Loss form which is found in **Appendix B**. The OM may also participate in the investigation of more serious accidents and incidents that occur on-site. The CHSD should also be immediately notified by telephone the on occurrence of a serious accident or incident. At the CHSD's discretion, he may also participate in the investigation.

The investigation process is summarized below:

- An initial identification / assessment of evidence will be made before anything is moved. Any item potentially considered as evidence will be secured and preserved under the guidance of the Legal Department.
- Witness interviews/statements will include the witnesses' names and the content of the information provided and will be captured on the Accident Report and Investigation Form. Notes from witness interviews will be collected as part of the investigation report.
- Appropriate equipment will be available to conduct the investigation. This equipment will include, as needed, a phone with a camera, tape measure, and industrial hygiene sampling equipment (e.g., direct reading instruments).

4.3 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 CHSD. The CHSD will update OSHA Forms 301 and the 300 log when necessary and distribute them to the affected office.

Appendix A

Accident Report and Investigation Form

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 Director
Cell: (631) 807-0193; Office: (631) 630-2416

PART 1: ADMINISTRATIVE INFORMATION

Project #: _____
Project Name: _____
Project Location (street address/city/state)**:**
_____
_____
Client Corporate Name / Contact / Address / Phone #:
_____
_____
_____
_____
_____

Immediate Verbal Notifications Given To:

Corporate Health & Safety	☐Yes	☐No
Office Health & Safety	☐Yes	☐No
Operations Manager	☐Yes	☐No
Project Principal	☐Yes	☐No
Project Manager	☐Yes	☐No
Client Contact	☐Yes	☐No

REPORT STATUS (time due):
☐ Initial (24 hr.) Date: _____
☐ Final (5-10 days) Date: _____

Accident Report Delivered To:

Corporate Health & Safety	☐Yes	☐No
Office Health & Safety	☐Yes	☐No
Operations Manager	☐Yes	☐No
Project Principal	☐Yes	☐No
Project Manager	☐Yes	☐No

REPORT TYPE: ☐ Loss ☐ Near Loss Estimated Costs: $ _____

OSHA CASE # Assigned by Corporate Health & Safety if Applicable:

Corporate Health & Safety Confirmed Final Accident Report
☐Yes ☐No

DATE OF INCIDENT: _____

TIME INCIDENT OCCURRED: _____ ☐AM ☐PM

INCIDENT LOCATION – City, State, and Country (If outside U.S.A.)
_____

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.

☐**INJURY** ☐**ILLNESS**

----------**Severity Level**----------

☐Fatality ☐First Aid ☐Medical Treatment
☐Restricted Work ☐Lost Time

OTHER INCIDENT TYPES

☐Spill / Release
Material involved:_____
Quantity (U.S. Gallons): _____

☐Misdirected Waste ☐Consent Order ☐NOV
☐Property Damage ☐Exceedance
☐Motor Vehicle ☐Fine / Penalty

ACTIVITY TYPE (Check most appropriate one.)

☐CAMP ☐Construction ☐Drilling ☐Driving ☐Excavation / Trenching
☐Gauging ☐O&M ☐Other Soil Work (e.g., Compaction) ☐Sampling ☐Site Walk/Inspection
☐Subsurface Clearance ☐Trucking ☐Waste Mgmt. ☐Work Area Prep. ☐Other

INJURY TYPE (Check all applicable.)

☐Abrasion ☐Amputation ☐Burn ☐Cold/Heat Stress ☐Inflammation ☐Laceration
☐Occupational Illness ☐Puncture ☐Rash ☐Repetitive Motion ☐Sprain/Strain ☐Other_____

BODY PART AFFECTED (Check all applicable.)

☐Respiratory ☐Neck ☐Chest ☐Abdomen ☐Groin ☐Back
☐Shoulder ☐Arm ☐Wrist ☐Hand/Fingers ☐Eye ☐Head
☐Face ☐Leg ☐Knee ☐Ankle ☐Foot/Toes ☐Other_____

I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)

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:
☐Newspaper ☐Television ☐Community Group ☐Neighbors ☐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

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

Appendix B – Near Loss Form

ROUX HEALTH & SAFETY NEAR LOSS 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: ☐ New York ☐ Massachusetts ☐ New Jersey ☐ Illinois ☐ CA - Los Angeles ☐ 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. ☐ Fire / Explosion
2. ☐ Injury / Illness
3. ☐ Security (e.g., theft, trespassing, vandalism)
4. ☐ Environmental (Spill, permit exceedance, etc.)
5. ☐ Transportation of personnel (vehicle accident)
6. ☐ Property/Equipment Damage
7. ☐ 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? ☐ **Yes** ☐ **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: ☐ **Yes** ☐ **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
2. Construction
3. Drilling
4. Driving
5. Excavation/Trenching
6. Gauging
7. O&M
8. Other Soil Work (e.g., Compaction)
9. Sampling
10. Site Walk/ Inspection
11. Subsurface Clearance
12. Trucking
13. Waste Management
14. Work Area Preparation
15. Other

***EQUIPMENT INVOLVED THAT CONTRIBUTED TO H&S NEAR LOSS - Select all that apply**

1. Air Stripper
2. API Separator
3. Automobile
4. Boom Material
5. Bulldozer
6. Cable
7. Carbon Drum / Vessel
8. Chain Block
9. Compressor, Air
10. Control Panel (local)
11. Crane (mobile)
12. Drill Rig
13. Drilling Equipment, Vacuum
14. Drum, Vertical
15. Dump Truck
16. Electric Heater
17. Electrical Power Supply
18. Engine, Combustion
19. Equipment Safety Grounding
20. Excavator / Power Shovel
21. Exclusion Zone Equipment
22 Fan / Blower
23 Fencing
24 Filter
25. Fire Extinguisher
26. Forklift
27. Front End Loader
28. Grader
29. Hammer
30. Knife
31. Non-Powered Equipment
32. Powered Equipment
33. Drill
34. Grinder
35. Hydraulic Torque Wrench
36. Powered Saw
37. Impact Wrench
38. Saw
39. Screwdriver
40. Shears
41. Shovel
42. Snip
43. Wrench
44. Hoist
45, Hook/Clamp/Buckle, etc.
46. Jack
47. Ladder, Extension
48. Ladder, Platform
49. Ladder, Step
50. Lock Out / Tag Out
51. Maintenance Tool, General
52. Manifold
53, Manlift/Basket/Cherry Picker
54. Motor, Electric
55. Oxidizer
56. Pallet
57. Piping
58. Piping, Hose
59. Piping, Injection/Mixing Point
60. Hydrojet
61. Centrifugal Pump
62. Diaphragm Pump
63. Reciprocating Pump
64. Regenerative Pump
65. Rotary Pump
66. Transfer Pump
67. Submersible Pump
68. Face Shield
69. Fall Protection
70. Gloves
71. Hard Hat / Helmet
72. Hearing Protection
73. Respiratory PPE (Chemical)
74. Respiratory PPE (Particulate)
75. Safety Glasses
76. Safety Goggles
77. Safety Shoes / Boots
78. Safety Vest / Clothing
79. Rope
80. Bailer
81. Geoprobe
82. Hand Auger
83. PID
84. Multi-Gas Meter
85. Sample Container
86. Split-Spoon Sampler
87. Sling
88. Snow Blower
89. Snow Plow
90. Space Heater
91. Air Sparging System
92. Carbon Treatment Sys
93. Chemical Oxidation S
94. Dual Phase Product Recovery System
95. Groundwater Pump and Treat System
96. POET System
97. Shed or Trailer
98. Vapor Extraction System
99. Vapor-Phase Treatment System
100. Other System, Type:___
101. Surge Tank
102. Underground Tank
103. Telemetry System
104. Testing Devices
105. Tractor Trailer
106. Truck, Flatbed
107. Truck, Pickup
108. Truck, Tank Truck
109. Truck, Vacuum
110. Safety Valve
111. Block Valve
112. Extraction Well
113. Monitoring Well
114. Recovery Well
115. Winch
116. Wire Rope
117. No Equipment Involved
118. MPT – Traffic Control Devices
118. Not in List (describe):___

APPENDIX H

Heat Illness Prevention Program

HEAT ILLNESS
PREVENTION PROGRAM

CORPORATE HEALTH AND SAFETY DIRECTOR	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**10/2019**
REVISION DATE	:	**03/2024**
REVISION NUMBER	:	**3**

TABLE OF CONTENTS

1. PURPOSE

Roux Associates, Inc. and its affiliated **companies**, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, "Roux") has established this heat illness prevention program to assist in preventing workplace accidents, injuries, and illnesses associated with temperature extremes. Roux is committed to taking every precaution to protect employees who might be exposed to heat stress, including establishing safe work practices, heat illness prevention controls, and emergency preparedness, which will be detailed in this plan.

2. SCOPE AND APPLICABILITY

Roux's Heat Illness Prevention Program applies to all employees who may be exposed to heat stress in the field.

3. ROLES AND RESPONSIBILITIES

The Heat Illness Prevention Program Administrator for Roux is the Corporate Health and Safety Director (CHSD), Brian Hobbs, CIH, CSP. The daily administration of the program is delegated to the Operations Manager (OM) and Office Health and Safety Manager (OHSM). The CHSD has the authority, responsibility, and overall accountability for the comprehensive implementation of this program.

All managers and supervisors shall implement and maintain the heat illness prevention program in work areas where there is a potential for heat stress.

Management Responsibilities

Management (i.e., Project Managers, Project Principals, OM) must provide the following to promote compliance and foster a good safety culture:

- Comply with applicable standards.
- Inform employees of the provisions of the heat illness prevention program and ensure understanding.
- Provide sufficient water, shade, rest areas, and other heat illness controls for employees.
- Assist with establishing work practices to minimize heat stress risks, such as acclimatization, required rest periods, employee monitoring, and strategic scheduling.
- Encourage employees to report hazardous conditions or heat illness symptoms.
- Provide training to any employee who could possibly be exposed to the risk of heat illness.

Employee Responsibilities

Employees are expected to actively participate in the organization's heat illness prevention program, which includes the following responsibilities:

- Receive appropriate training with regard to heat stress.
- Understand core concepts of heat illness prevention and follow guidelines to mitigate risks.
- Recognize the signs and symptoms of heat illness and immediately report them.
- Cooperate with workplace inspections and incident investigations.

Effective Communication

All Roux employees shall be accountable for ensuring there is effective communication with both the field team and their subcontractors. Communication between Roux employees project leads (e.g., Project Principal, Project Managers) and subcontractors (if applicable) will be established and maintained so that employees can quickly

contact should there be a change in condition or someone at the Site exhibits signs/symptoms of heat stress. These types of incidents would follow Roux's Incident Investigation and Reporting Management Program 2.12 and Roux's Injury Illness Prevention Program 2.22.

4. HAZARD IDENTIFICATION AND ASSESSMENT

Prior to scheduled fieldwork, the project team shall ensure a hazard assessment is conducted as it relates to heat stress. This will include a determination of how much heat and exertion employees are likely to be exposed to based on the work activity.

Factors that can increase heat stress include the following:

- Temperatures at the work site;
- Humidity;
- A lack of air movement or exchange;
- The amount of time employees spend working in the heat;
- The time of day work takes place;
- Sources of radiant heat (e.g., sunlight, fire, or hot furnace);
- Work activities that produce heat (e.g., welding);
- Physical contact with warm or hot objects or liquids;
- The clothing and PPE employees are required to wear; and/or
- Physically strenuous work.

Results of the hazard analysis should be used to determine appropriate controls for mitigating heat stress, whenever possible, for planning acclimatization, and for developing work schedules that rotate workers to limit employee exposure. Typically, the Site Supervisor (SS) or Site Health and Safety Officer (SHSO) shall conduct worksite observations to ensure all employees follow heat illness prevention procedures and that hazards are sufficiently controlled. However, all employees should be continuously evaluating work site conditions and be able to recognize heat stressors in order to prevent heat illnesses.

5. TRAINING

All Roux employees shall be trained on the topics listed below prior to beginning work, which may potentially expose workers to heat stress.

Training Topics

- The environmental, behavioral, and personal risk factors for heat illness, such as radiant heat sources, exertion, clothing and PPE, and use of alcohol or drugs.
- Types of heat illnesses, common symptoms, and appropriate emergency response for each.
- The knowledge that mild symptoms may quickly become more severe or life-threatening.
- The importance of immediately reporting any signs or symptoms of heat illness to the supervisor.
- The employer's responsibility to provide shade, water, access to first aid, and cool-down rests during work and the employee's freedom to exercise their rights under this standard without fear of retaliation.

- The employer's heat stress plan and its procedures:
  - Procedures for employees who are newly assigned to work in high-heat areas.
  - The organization's acclimatization methods, as applicable.
  - Heatwave procedures.
  - Heat illness and emergency response, including contact information.
- The importance of frequent consumption of water and the taking of rest breaks.
- How heat illness prevention applies to employees' specific tasks.

Increasing Training Effectiveness:

- The SS/SHSO will hold daily tailgates with the field team to go over daily work tasks and basic safety information including Job Safety Analysis (JSA) review as well as incorporate elements such as current weather and effects on the work activities for the day.
- If a heat wave or high heat is anticipated, OHSMs and/or OMs will provide communications to Roux employees prior to their shifts and remind them of any special high heat procedures.

6. DRINKING WATER

Employees shall be given access to potable drinking water. Access to water will be provided as near as possible to where employees are working, and there shall be enough locations so employees will have sufficient water. Water should be fresh and pure, free of taste or smell that would discourage employees from drinking, comfortably cool, and obtained from an approved source.

The recommendation is that during warm or hot weather, employees drink four 8-ounce glasses of water, or a total of one quart per hour, throughout the entire work shift. Easy access to sufficient potable drinking water throughout the work shift encourages employees to drink.

During a heat wave, water shall be replenished more often to keep available and cool. Water containers (and all spouts and levers) must be kept clean. If able, provide single-use drinking cups with appropriate waste receptacles. Accessible sanitation facilities shall also be maintained at work Sites as appropriate.

SS/SHSO is responsible for the following:

- Drink sufficient water before, during, and after work shifts to maintain hydration.
- Encourage frequent drinking of small amounts of water throughout the shift. In high-heat environments, remind field staff and subcontractors that drinking extra water may be necessary.
- Discourage the choice of drinks with caffeine or sugar that may possibly dehydrate employees instead of water. Also, discourage the drinking of alcohol.
- Monitor the water supply.
- If employees become dehydrated and are unable to alleviate symptoms with the steps below, get them immediate medical attention.

Field Staff/Subcontractors are responsible for the following:

- Drink sufficient water before, during, and after work shifts to maintain hydration. Drink up to 4 cups of water per hour, especially during hot weather.
- Be aware that in high-heat situations, you may need to drink more water.

- Monitor yourself and others for signs of dehydration. If you feel dehydrated:
  - Follow Roux's Incident Notification Flowchart;
  - Rest in the shaded resting area; and
  - Drink water in small amounts, but frequently.

7. ACCESS TO SHADE

Access to shaded areas will be provided to Roux staff, as needed. Employees are encouraged to use these areas when they feel overheated. Roux's SS/SHSO shall oversee the proper implementation of shaded areas and will communicate these locations on a daily basis with the Field Team.

Depending on the Site, shaded areas can include the following:

- Pop-up Tents
- Canopies
- Umbrellas
- Structures mechanically ventilated or open to air movement
  - Garage
- Conex-mounted RV canopies
- Full and thick tree canopies that block direct sunlight
- Buildings
- Enclosed areas only if they provide cooling comparable to shade in open-air
  - Vehicles with air conditioning

Shaded Area Requirements

The shade shall be strong enough to cool employees down and other shadows should not be visible in the shade. The shade will be provided by Roux when the air temperature exceeds 80°F. If the temperature is less than 80°F, shade will be available and provided upon request. The SS/SHSO will monitor conditions to determine when the air will exceed (and is exceeding) 80°F. For most Sites, air will be monitored hourly and shade will be set up immediately if 80°F is exceeded.

Shade shall be located as close as practical to areas where employees are working and is easily accessible. These areas will be considered safe and free from other hazards. Shaded areas should be large enough to accommodate all employees who are on a break, resting, or recovering without crowding. Should natural vegetation be used for shade, the SS/SHSO will evaluate shade for effectiveness.

Field Staff Responsibilities

Field Staff should take ordinary rest breaks in the shaded areas and monitor themselves for signs of heat stress, and go to the shaded area when they need to cool down. Any issues or problems with shaded areas should be reported to the SS/SHSO for the Site.

If shaded areas are used for a preventative cool-down, the SS/SHSO will ensure the affected employees will remain in the shade until they begin to feel better. The SS/SHSO will continue to monitor the employees and ask them if

they are experiencing symptoms of a heat illness. Employees shall not be sent back to work before symptoms have ended and at a minimum at least 10 minutes of rest.

8. MONITORING AND SCHEDULING

Monitoring

The SS/SHSO and Field Team will continue to monitor themselves and others for signs of heat illness. The SS/SHSO will monitor when the air temperature exceeds 80°F. Throughout the summer, weather and temperature will be monitored at least two weeks ahead, and the work schedule will be planned to accommodate the expected weather.

Scheduling

Scheduling accommodations may include:

- Working during cooler hours of the day
- Working at night
- Stopping work early
- Rescheduling work activities
- Increasing frequency of breaks

In general, strenuous work activities shall be rescheduled to the coolest parts of the day.

Special precautions are required for temperatures above 80°F, 95°F, and heat waves. These precautions are provided in the sections below.

9. ACCLIMATIZATION AND NEW EMPLOYEE PROCEDURES

Roux requires employees to be acclimatized in order for them to better tolerate heat in the workplace. Acclimatization is the physical process of adapting to a different thermal environment, allowing a better toleration of heat. Acclimatization procedures require gradual exposure that gives the employee time to adjust to each level of exposure. Acclimatization is essential for new employees but is necessary for all employees when the temperature significantly changes. Heat stress is much more likely if these procedures are not followed.

The SS/SHSO is responsible for observing new employees during their first 14 days of employment in high-heat areas.

Re-acclimatization is necessary if employees are absent from high-heat environments for a week or more or the temperature increases significantly.

10. HEATWAVE AND EXTREME HEAT PROCEDURES

Heat Wave Procedures

A heat wave is defined as consistent temperatures over 80°F or if the temperature is 10° higher than the average daily temperatures in the preceding 5 days.

SS/SHSO and Project Management (e.g., PP, PM) shall closely observe and monitor employees during a heat wave. The Field Teams should institute a ratio of one SS to 20 or fewer employees, a mandatory buddy system, or

a consistent practice for supervisors to check on employees. Pre-shift meetings to review high-heat procedures with employees will be carried out to emphasize work-rest schedules, drinking water, shade, etc.

Extreme Heat Procedures

When work-site temperatures equal or exceed 95°F, the employer will enact extreme heat procedures:

- Employees will be closely observed by the SS/SHSO for signs of heat illness. New employees will be supervised for acclimatization.
- Effective communication and monitoring will be assured through the use of periodic check-ins with the SS/SHSO via phone. Communications between employees and Project Management (e.g., PP/PM) will be established and maintained. Mandatory 10-minute break periods are required for every two hours worked. SS/SHSO must enforce this rule.
- Pre-shift safety tailgate meetings will occur to review procedures and to remind employees to drink water and take cool-down rests if needed. SS/SHSO shall remind employees to rest and drink water. Employees should drink more water than usual.

11. EMERGENCY RESPONSE PROCEDURES

Roux is dedicated to providing prompt appropriate care for all employees who report or show symptoms of heat illness. If an employee shows signs of heat illness, they will be monitored and shall not be left alone or sent home without being offered first aid or emergency medical services. If on-Site personnel require any medical treatment, the following steps will be taken:

1. 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, AllOne Health (AOH), immediately following the notifications provided above.
2. 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 locations and directions is provided within Site Specific Health and Safety Plans.
3. 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).
4. The SHSO and Project Manager will perform a Loss Investigation (LI) and the Project Team will complete the final Loss Report.

12. HEAT-RELATED ILLNESSES

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 (PPE) in hot-weather environments. For these reasons, the company will provide potable drinking water and access to shade or other areas of relief (i.e., air-conditioned vehicles and work trailers). Supervisors, prior to supervising personnel in the field as well as all personnel involved with the fieldwork of a project, are trained in this HASP that includes preventing heat-related illnesses and the below procedures in response to heat-related symptoms and illness. Since much of our work is dependent upon environmental factors beyond our control, we must closely monitor air temperature and humidity and be aware of avoiding radiant heat sources and providing as much air circulation as possible wherever we work. Physical factors that need to be evaluated as part of our Job Safety Analysis (JSA) reviews include the level of physical activity and duration of work

and the type (i.e., color, weight breathability) of the clothing we select. In addition, personal factors such as age, weight, fitness, drug/alcohol use, and prior history of heat-related illness need to be considered.

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.

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.

Heat Stroke

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

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

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

13. OTHER HEAT CONTROLS

Clothing and PPE

Employees should choose clothing that is reflective, light-colored, lightweight, loose-fitting, and breathable. Clothing should cover the exposed parts of the body. In direct sun, hard hats with a brim or bill may be helpful. Should specialized cooling garments be applicable, please consult with your OM/OHSM/CHSD.

Managing Employee Risk Factors

It is recommended that employees are aware of how their health can affect their risk of heat stress. The following increases ones risk for a heat related illness:

- A poor level of physical fitness
- Obesity
- Chronic or acute illnesses
- Conditions such as diabetes, heart disease, or high blood pressure
- Certain medications, such as diuretics
- Age (60+)

Employees should:

- Maintain their health outside of work
- Be aware of the effects of medications
- Drink adequate amounts of water
- Eat light, cool meals during work shifts and save heavy meals until after the shift is over
- Do not skip meals: food helps replace electrolytes when sweating
- Take breaks as needed
- Do not consume alcohol prior to working in a hot environment

APPENDIX I

Community Air Monitoring Program

Community Air Monitoring Plan

580 Gerard Former Post Office
Vehicle Repair Shop Site
580-610 Gerard Avenue
Bronx, New York
NYSDEC BCP Site No. C203142

August 8, 2024

Prepared for:

SB Gerard Avenue LLC
40 West 39th Street, 5th Floor
New York, New York 10018

Prepared by:

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Appendix

1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), on behalf of Silverback Development (Participant), have developed a project specific Community Air Monitoring Plan (CAMP) to implement real time monitoring at the Site, which occupies Tax Lot 1 of Tax Block 2538, during remedial construction activities.

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 ($\mu g/m^3$) per 15-minute period. This setting will allow proactive evaluation of Site conditions prior to reaching Action Levels of 100 $\mu g/m^3$ 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 $\mu g/m^3$ 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 $\mu g/m^3$ 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 $\mu g/m^3$ 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 $\mu g/m^3$ 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 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.

1.4 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.

1.5 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

1. Action Limit Summary for VOCs and Particulates

Table 1. Action Limit Summary for VOCs and Particulates, 580 Gerard Former Post Office Vehicle Repair Shop Site, Bronx

Contaminant	Downwind Action Levels*	Action/Response
Volatile Organic Compounds (VOCs) (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.
Particulates (Monitoring Via Particulate Meter and Observation)	< 100 ug/m^3	1. If dust is observed leaving the work area, then dust control techniques must be implemented or additional controls used.
	100 ug/m3 < level < 150 ug/m^3	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^3 above the upwind level and provided that no visible dust is migrating from the work area.
	> 150 ug/m^3	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^3 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.

APPENDIX A

Action Limit Report

ACTION LIMIT REPORT

Project Location: 580 Gerard Former Post Office Vehicle Repair Shop Site
580-600 Gerard Avenue, Bronx, New York

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: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

ACTIVITY DESCRIPTION

CORRECTIVE ACTION TAKEN

ROUX

APPENDIX F

Quality Assurance Project Plan/ Field Sampling Plan

Site-Specific Quality Assurance Project Plan / Field Sampling Plan

580 Gerard Former Post Office
Vehicle Repair Shop Site
580-610 Gerard Avenue
Bronx, New York
NYSDEC BCP Site No. C203142

December 9, 2024

Prepared for:

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Appendix

1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), on behalf of SB Gerard Avenue LLC (referred to herein as the Volunteer), has prepared this Quality Assurance Project Plan/Field Sampling Plan (QAPP/FSP) to describe the measures that will be taken to ensure the data generated under the Site Management Plan (SMP) for the 580 Gerard Former Post Office Vehicle Repair Site located at 580-610 Gerard Avenue, Bronx, New York (Site) are of quality sufficient to meet project-specific data quality objectives (DQOs). This QAPP/FSP also includes field sampling procedures.

The Site is enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). Site Number C203142 is assigned to the Site. This QAPP/FSP was prepared in accordance with the guidance provided in NYSDEC Technical Guidance DER-10 Technical Guidance for Site Investigation and Remediation (DER-10), the NYSDEC BCP Guide, 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/FSP describes in detail the field sampling and quality assurance/quality control (QA/QC) methods to be used during sampling activities that may be required during implementation of the SMP.

This QAPP/FSP 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 remediation and site management phase. Information contained in this QAPP/FSP 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 sampling program is designed to meet the data quality objectives (DQOs) set forth in DER-10. Specifically, the potential sampling objectives for this Site are:

- Analyze post-treatment groundwater samples on a quarterly basis for up to 8 rounds for volatile organic compounds (VOCs) with comparison to the NYSDEC Ambient Water-Quality Standards and Guidance Values (AWQSGVs).

Sampling procedures are discussed in Section 5 of this QAPP/FSP. 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. Professional resumes are included as Appendix A.

Project Principal

Mr. Robert Kovacs, P.G., LSRP, of Roux will serve as Project Principal. The Project Principal is a New York State licensed professional geologist. The Project Principal is responsible for defining project objectives and bears ultimate responsibility for the implementation of the SMP activities.

Remedial Engineer

The Remedial Engineer for this project will be Mr. Paul Martorano, 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 SMP and future remedial program for the Site. The Remedial Engineer will certify that the SMP activities were observed by qualified environmental professionals under her supervision as well as any other relevant provisions of ECL 27-1419 have been achieved in full conformance with the SMP.

Project Manager

Jessica Lam 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 will be determined prior to the start of the remedial work. The Field Team Leader bears the responsibility for the successful execution of SMP activities. 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

The Laboratory Project Manager will be determined prior to the start of the work. 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 Project Principal and Project Manager.

Quality Assurance Officer

Rachel Henke 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 that the data collection is conducted in accordance with the FSP and QAPP. 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.

Data Validator

James Hauri, PhD, of Roux Associates, Inc. will serve as the Data Validator for this project. The Data Validator will be responsible for validating all analytical data. In addition, the Data Validator will prepare independent Data Usability Summary Reports (DUSRs) for all analytical data.

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

This section provides a detailed discussion of the field procedures to be used during sampling of groundwater under the SMP. Additional details regarding sampling procedures and protocols are described in Roux's relevant Standard Operating Procedures (SOPs), which are provided in Appendix B. The types of containers, volumes, and preservation techniques for the aforementioned testing parameters are presented in Table 1.

4.1 Groundwater Sampling

Groundwater sampling will be conducted as part of the SMP. The well locations are meant to provide post-treatment groundwater conditions downgradient of the Site. The SMP calls for quarterly monitoring of two monitoring wells downgradient of the Conditional Track 1 area. All well locations are shown on Figure 4 of the SMP and groundwater sampling procedures are outlined below in Section 5.1.

Groundwater samples will be collected from the monitoring wells and submitted for laboratory analysis for volatile organic compounds (VOCs) and compared to the NYSDEC AWQSGVs. Field parameters (e.g., pH, dissolved oxygen, oxidation-reduction potential [ORP], etc.) will also be collected using a water quality meter during purging prior to sample collection.

5. Field Sampling Procedures

This section provides a detailed discussion of the field procedures to be used during sampling as part of the SMP. Additional details regarding sampling procedures and protocols are described in Roux's relevant Standard Operating Procedures (SOPs), which are provided in Appendix B.

5.1 Groundwater Sampling

Groundwater samples from the two downgradient monitoring wells will be collected no sooner than one quarter following treatment. Prior to sampling, depth to water will be measured at each well using an electronic water level meter with an accuracy of +/ 0.01 feet. All wells will then be purged and sampled using a low-flow method. Purging and sampling will be performed consistent with USEPA low-flow sampling requirements. Additional details for the collection of groundwater samples are included in the Roux SOPs in Appendix B. All groundwater samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux's SOPs.

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/FSP. The types of containers, volumes, and preservation techniques for the aforementioned testing parameters are presented in Table 1.

6.2 Sample Custody Documentation

The purpose of documenting sample custody is to ensure that 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 portion, 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 field work 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

If sample shipment is necessary, 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 cooler(s) for shipment:
    - tape drain(s) of cooler shut;
    - affix “This Side Up” arrow labels and “Fragile” labels on each cooler; and
    - place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number.

3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material approximately at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed in packaging material.
9. If ice is required to preserve the samples, ice cubes should be repackaged in Zip-lock™ bags and placed on top of the packaging material.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to courier as appropriate.
11. Separate chain of custody forms. Seal proper copies within a large Zip-loc™ bag and tape to inside cover of cooler. Retain copies of all forms.
12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. 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

The primary intended use for the SMP data is to confirm that remedial action objectives have been met for groundwater samples. The primary DQO of the sampling program, therefore, 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, including laboratory control samples and matrix spike 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. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called "field blanks").

Table 1 lists the preservation, holding times and sample container information. Table 2 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.

All SMP "assessment" analyses (i.e., TCL/Part 375 plus 30/ TAL) will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW 846 methods. The laboratory selected to analyze the field samples collected during implementation of the SMP shall maintain a New York State

Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Contract Laboratory Protocol (CLP) certification for each of the “assessment” analyses listed in Section 2.

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 for the SMP.

7. Site Control Procedures

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. In order to accomplish this objective, the QAPP addresses three main considerations:

- The establishment of discrete work zones during performance of the Work;
- The decontamination of field equipment; and
- The disposal of all waste.

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 Appendix E to the SMP.

7.1 Field Work Zones

Field work zones will be limited to areas where excavation, stockpiling, and soil sampling is being conducted. Access to these areas will be limited in accordance with the HASP. Control of work zone access will be the responsibility of the individual(s) designated as a Site Health and Safety Manager. At the completion of each work day, all loose equipment (e.g., sampling equipment, coolers, etc.) will be secured. Equipment will remain onsite within an established, secured zone.

7.2 Decontamination

To avoid the spread of contamination, all 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 B. 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.

7.3 Waste Handling and Disposal

All waste materials (cuttings, decontamination water, etc.) generated during implementation of the SMP 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. Preservation, Holding Times, and Sample Containers
2. Field and Laboratory QC Summary

Table 1. Field and Laboratory QC Summary

QC Check Type	Minimum Frequency	Use
Field QC		
Duplicate	1 per matrix per 20 samples or SDG*	Precision
Trip Blank	1 per VOC cooler	Sensitivity
Field Blank (non-PFAS)	1 per matrix per 20 samples	Sensitivity
Field Blank (PFAS)	1 per matrix per day	Sensitivity
Laboratory QC		
Laboratory Control Sample	1 per matrix per SDG	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate**	1 per matrix per SDG	Accuracy/Precision
Surrogate Spike	All organics samples	Accuracy
Laboratory Duplicate	1 per matrix per SDG	Precision
Method Blank	1 per matrix per SDG	Sensitivity

Notes:

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

** Provided to lab by field sampling personnel

PFAS - Per- and Polyfluoroalkyl Substances

Table 2. Preservation, Holding Times and Sample Containers

Analysis	Matrix	Bottle Type	Preservation(a)	Holding Time(b)
Target Compound List (TCL)/Part 375				
SW-846 8260C	Water	Three 40mL VOA vials, teflon lined cap	Hydrochloric Acid	14 days from sample collection

[a] All soil and groundwater samples to be preserved in ice during collection and transport
[b] Days from date of sample collection.
TAL - Target Analyte List
PFAS - Per- and Polyfluoroalkyl Substances
TCL - USEPA Contract Laboratory Program Target Compound List
USEPA - United States Environmental Protection Agency

APPENDICES

A. Professional Resumes

B. Roux Standard Operating Procedures

APPENDIX A

Professional Resumes

PROFESSIONAL PROFILE

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209 Shafter Street
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EDUCATION

BA, Biological Sciences, University of Delaware, Newark, Delaware, 1999.

PROFESSIONAL LICENSES

Licensed Site Remediation Professional, New Jersey (License No. 627589)
New York State Professional Geologist (License No. 000437)
NJDEP UST Certification Program-Subsurface Evaluator (License No. 239024)

Robert Kovacs, LSRP, PG

Principal Scientist

EXPERIENCE SUMMARY

Twenty-four years of experience: Principal, Senior, Project, Staff and Staff Assistant Environmental Scientist at Roux, Islandia, New York.

TECHNICAL SPECIALTIES

Design, implementation and management of Environmental Site Assessments, Remedial Investigations, Remedial Actions, and Construction Support at Brownfield Redevelopment, Transportation, and Industrial sites; Development of innovative cost-saving project strategies and skilful regulatory agency negotiations; Characterization and decommissioning of Industrial Manufacturing facilities; Roux Corporate QA/QC Officer.

REPRESENTATIVE PROJECTS

- **Lendlease Java Street Waterfront Redevelopment – Greenpoint, New York.** Principal-in-Charge for this large redevelopment project located on the waterfront in Greenpoint, New York. This 2.6-acre site is being redeveloped into a mixed-use development, including a residential tower with 800 residential units, retail space, and a shoreline esplanade with NYC Ferry terminal access. Work on this project has included due diligence support, involving the completion of a Phase I and Phase II ESA, NYSDEC BCP application, preparation of a Remedial Investigation Report and Remedial Action Work Plan, as well as supporting Lendlease in negotiation with NYSDEC to maximize soil reuse, site preparation and tangible tax credits. Work also included implementing an extensive In-situ Waste Characterization program, including PFAS investigation, negotiating soil reuse, and developing and implementing a complex remedial design program and community air monitoring program. The remedy for the site included design of a Sub-Slab Depressurization System (SSDS) to mitigate vapors beneath the future building, as well as negotiation with NYSDEC and NYCOER to ensure 421a schedule requirements were achieved. As part of this work, soil borings, monitoring wells, piezometers, and soil vapor monitoring points were installed, and hydrogeologic cross sections were prepared. Additionally, the tidal influence of the East River on site groundwater was studied, and a benthic sediment investigation was conducted in the East River.

  This project will achieve the highest green and sustainable standards, and includes a massive, closed loop geothermal system to provide heating and cooling. Once complete, this all-electric project will be the largest residential project in New York State to use a geothermal exchange system. Components of this system include, in part, a well field of over 320 vertical geothermal wells drilled down to a depth of approximately 500 feet below land surface. Roux is providing several critical roles on this project with respect to construction of this massive geothermal system.

- **Amtrak Sunnyside Yard State Superfund Site, Queens, New York.** Principal-in-Charge for multiple projects to support investigation and remediation activities at this State Superfund site. Mr. Kovacs was responsible for overseeing activities in all six Operable Units (OUs), including unsaturated and saturated soil, groundwater, separate-phase hydrocarbon, soil vapor and on-site sewer system. His responsibilities on these projects included PFAS investigations; UST removals; characterizing subsurface conditions, including soil (collected hundreds of soil samples to characterize the 130+ acre active railyard), as well as characterizing a 250,000-gallon PCB-contaminated separate-phase hydrocarbon plume. Additionally, he was responsible for overseeing the design and implementation of remediation activities, including soil excavation and offsite disposal, removal and abandonment of USTs ranging in sizes up to 17,000 gallons, demolition of contaminated buildings and infrastructure, and installation and operation of a dual phase high vacuum

extraction (DPVE) system to recover PCB-contaminated separate-phase hydrocarbon through a network of over 40 recovery wells. Due to the highly volatile nature of the separate-phase hydrocarbon and the urban setting of this site, extensive emissions and odor engineering controls were used when excavating and managing soil and product. Additionally, extensive Community Air Monitoring was completed during all phases of work. Mr. Kovacs was also responsible for interaction with all regulatory agencies, as well as preparing and/or reviewing all major project reports and deliverables.

- **Amtrak Infrastructure Construction Projects.** Principal-in-Charge of several large infrastructure upgrade projects for Amtrak, including the Next Generation Acela Ready Track project, the Amtrak Airo support projects, Security Enhancement project, and Water Main Upgrade projects. Mr. Kovacs is serving as Project Principal, and is involved in the planning, site characterization (including PFAS evaluations), construction oversight, and regulatory agency coordination associated with these projects. These projects include substantial soil and sewer sediments characterization and management components, including management of characteristically hazardous soils and management of free-product impacts. Additionally, these projects include large community air monitoring programs, as required by NYSDEC. Roux has been successful in integrating these environmental requirements into these construction projects with minimal impact to the construction team's schedule.
- **Pharmaceutical Manufacturing Facility, Brooklyn, New York.** Project Manager/Project Principal for environmental work associated with the seven-block former manufacturing plant. This Site included a former 700,000 square foot manufacturing plant, as well as several other former industrial facilities with operations starting as far back as the 1850s. Responsibilities included UST removals; the design and completion of multiple phases of subsurface investigations to characterize soil and groundwater quality, as well as soil vapor. Contaminants included hydrocarbons, benzene, PCBs, and heavy metals, including lead, mercury, and arsenic. Work included development and preparation of investigation and remediation work plans, coordination and management of field investigations, including the

  installation of shallow and deep monitoring wells and soil borings using sonic drilling methods, completion of a geophysical survey, collection of groundwater samples, and management of remediation activities. Remediation activities included soil excavation, UST removals, and the installation of a soil vapor extraction and air sparging system. Work was completed under several different regulatory agencies, including NYSDEC and NYCOER. Also provided presentations to school authorities, including the NYC DOE, to communicate the progress of the project and to educate administrators regarding the Site's environmental issues.
- **Industrial Warehouse Development – Bayshore, New York.** Principal-in-Charge for a 350,000 square foot industrial warehouse development located in Bayshore, Long Island, NY. As part of the project an initial Phase II investigation and PFAS evaluation was completed at this industrial site that contains a large former landfill. Roux successfully enrolled this site in the NYSDEC BCP and is currently developing the remedy for the site. Major remedial elements include an extensive Sub-Slab Depressurization System (SSDS) system to manage highly elevated methane vapor from the former landfill, as well as the management of large quantities of soil for disposal and reuse.
- **Affordable Housing Development – Bronx, New York.** Principal- in-Charge for the redevelopment of a former US Postal Service Fleet Maintenance facility located in the south Bronx. This site will be redeveloped into a 100% affordable housing complex. I was retained to complete all initial due diligence activities, including PFAS investigation, and to evaluate possible NYSDEC BCP eligibility. Once determined the site is a good candidate for the BCP, we prepared a BCP Application, and all required reporting. We also ensured that the site met 421a schedule requirements throughout the development and implementation of an Interim Remedial Measures (IRM) Plan. Full scale remediation is currently underway, including the remediation of hazardous soils, removal of USTs, and removal of multiple hydraulic lifts. Responsibilities also included design of a Sub-Slab Depressurization System (SSDS) to mitigate vapors beneath the future building.
- **Chlorinated Solvent Remediation – Parsippany-Troy Hills, New Jersey.** Principal-in-Charge for the Remedial Investigation and Remedial Action implementation associated with a former dry cleaner release located in Parsippany-Troy Hills, New Jersey. We were retained by one of the largest real estate developers in the United States to complete this project. Soil, groundwater, and subsurface vapor were impacted with chlorinated VOCs as a result of the former dry cleaner operations. Responsibilities included the design and management of a Supplemental RI that included the installation of soil borings, monitoring wells and the completion of groundwater vertical profiling. Additionally, Mr. Kovacs was responsible for the design, implementation, and management of an extensive groundwater remediation injection program in which approximately 200,000 pounds of Zero-Valent Iron (ZVI) and 2,500 gallons of Emulsified Vegetable Oil (EVO) were injected into the subsurface using pneumatic fracturing. Initial post-treatment results show over 95 percent reduction in concentrations of chlorinated VOCs in groundwater. Furthermore, he was responsible for the design,

installation, and operation of a SVE system to address impacted vadose zone soil.

- **Brookfield Hudson Exchange West – Jersey City, New Jersey.** Principal-in-Charge and LSRP for the first three towers as part of this mixed-income development near the Jersey City waterfront. Overall, this project will include 11 residential towers. To date, two towers are completed, and one is under construction. I am LSRP of record for: Phase 1A (625,000 square foot, 35-story tower), Phase 1B (432 unit, 35-story tower), and Phase 2 (60-story tower, with 802 Units and ShopRite supermarket planned for the second floor). Responsibilities included all initial site investigation, remedial design, and remedial implementation. Additionally, I was responsible for all compliance with NJDEP requirements, including preparation and certification of all reports, preparation of Remedial Action Permits, issuance of RAOs, and implementation of all post remedial activities and reporting.
- **Residential/Commercial Redevelopment – Brooklyn, New York.** Principal-in-Charge for a mixed-use development located in Red Hook, NY. Completed Phase II investigation and designed and implemented several Interim Remedial Measures. Also advised client on the most advantageous regulatory pathway to implement the redevelopment project. We are currently in the process of submitting a BCP Application to NYSDEC.
- **Chlorinated Solvent Release – Bernardsville, New Jersey.** Principal-in-Charge for the investigation of an extensive chlorinated solvent plume emanating from a former dry cleaner site. Contamination from this site has migrated far off site in groundwater, and has potentially impacted nearby surface water. Work includes installation of soil borings and monitoring wells to characterize contamination in soil, perched water, groundwater in the deep unconsolidated aquifer zone, as well as groundwater in the weathered bedrock matrix and bedrock matrix. Further, contamination from the Site is co-mingled with contamination from other solvent release sites, complicating NJDEP negotiations and investigation/remedial requirements. Mr. Kovacs serves as the LSRP of record for this project.
- **UST Spill Site – Brooklyn, New York.** Principal-in-Charge for the investigation of a Spill in Williamsburg, Brooklyn, New York. M. Kovacs lead the project team in successfully demonstrating to NYSDEC's Spills Group that impacts to a deep groundwater zone beneath the client's site were a result of offsite contamination migrating onsite from a nearby active gasoline station (not a result of the client's former industrial operations). Impacts included the presence of several feet of free-product in a deep groundwater zone. Furthermore, he was successful in getting the client's Spill Case closed, saving the client from additional investigation activities, and what will likely be a multi-million-dollar remediation to address free-product beneath a semi- confining clay zone.
- **Former Vehicle Maintenance Facility – Parlin, New Jersey.** Project Manager for the removal of (2) waste oil USTs, a subsurface oil water separator, piping, and remediation of associated petroleum contaminated soil at a former vehicle maintenance facility in Parlin, New Jersey. Roux was retained by one of the largest real estate developers in the United States to complete this project. This remediation was completed to allow for a new, national tenant to occupy this retail space. As part of this work, it was determined that a historic release occurred from the OWS, triggering a RI for petroleum-related VOCs and chlorinated VOCs in soil. Mr. Kovacs was also responsible for the development and implementation of the Remedial Action for the Site, which included excavation and off-site soil disposal. SESOIL modeling was also utilized to demonstrate groundwater (approximately 100 feet deep) was not impacted by the shallow soil contamination. As part of this project, he took a lead role in preparing the SI Report, RI Report, RAW, RAR, Receptor Evaluation, and the Unrestricted Use RAO.
- **NJ Transit Active Bus Facility, New Jersey.** Project Principal for the completion of a RI at an active bus garage located in Fairview, New Jersey for a major transit agency. Responsibilities included the delineation of a free-product plume, characterization of soil and groundwater quality, report preparation, and correspondence with the NJDEP. Moreover, Mr. Kovacs was responsible for implementing free-product Interim Remedial Measure efforts. Currently, he is finalizing the RI report for the Site, and managing the Remedial Action design, and supporting the LSRP in meeting all NJDEP administrative requirements.
- **Residential Hi-Rise Development – Manhattan, New York.** Principal-in-Charge for a redevelopment site in mid-town Manhattan working for a private developer who is building a mixed-use retail/commercial tower. Work included a Phase I ESA and Phase II ESA. As part of the Phase II shallow bedrock was identified in portions of the site, and an LNAPL plume was identified in the overburden soils. Responsibilities included bedrock evaluation, LNAPL recovery utilizing multiple different techniques. Responsibilities also included construction support, health and safety support, management of all soil excavated and transported off site, and the design of a Sub-Slab Depressurization System (SSDS) to mitigate vapors in the vadose zone beneath the new building structure that were emanating from groundwater.
- **Ship Dry Dock Facility – Hoboken, New Jersey.** Project Manager for the completion of a Preliminary Assessment and Site Investigation (PA/SI) at an active ship dry dock facility in

Hoboken, New Jersey. Responsible for the coordination and management of field investigation activities, which included soil, groundwater, and sediment sampling, as well as the preparation of a PA and SI report. This work was completed on behalf of a potential buyer of the property who planned to redevelop this site into a New York City ferry terminal.

- **BICC Cables – Yonkers, New York.** Project Manager for the investigation and remediation of the interior and subsurface soils of a former cable manufacturing facility located in Yonkers, New York to be redeveloped into a movie studio. Responsibilities included the completion of several large-scale investigations, including the collection of wipe, soil and building material samples to characterize PCB and lead impacts at this 200,000+ square foot facility Additional tasks included oversight of the remediation of interior surfaces using several different methods for the removal of PCBs and lead, and remediation of a sub-surface drainage trench and process water system. Further work included the preparation of a Remedial Investigation report and a Feasibility Study report for submittal to the NYSDEC.
- **Amtrak Electrical Substation – Rahway, New Jersey.** Project Manager for the RI and RA design and implementation at an active electrical substation in Rahway, New Jersey for a national passenger railroad agency. Responsibilities included completing an RI to delineate PCBs in soil, and the management of free- product recovery programs. Further, Mr. Kovacs was responsible for managing the RA at the Site, which included soil excavation and offsite disposal, and free- product recovery. As part of this project, he supported the Site LSRP and took a lead role in preparing the Supplemental RI Report, RAW, RAR, Receptor Evaluation, and the Unrestricted Use RAO. Additionally, he assisted the LSRP in satisfying all NJDEP administrative requirements, including preparation of forms, public notifications, and submittal of fees.
- **Echo Bay Redevelopment – New Rochelle, New York.** Project Manager for the completion of Phase I and Phase II Environmental Site Assessment activities associated with a proposed mixed-use redevelopment located in Westchester, New York. Work included management of subsurface investigation activities to characterize soil conditions, and working closely with client's architects and construction contractors to integrate the proposed site remediation into the project development plan (including evaluating multiple potential disposal scenarios). Site contaminants included hydrocarbons (including free-product plume from former USTs), and historic fill constituents.
- **Former Dry Cleaner – Ramsey, New Jersey.** Project manager for the SI, RI, and vapor intrusion investigation at a former dry cleaner in Ramsey, New Jersey. Responsibilities included managing and coordinating field investigations, preparing remedial cost estimates for redevelopment, and preparation of reports and satisfying NJDEP Administration requirements. This work is being done to support redevelopment of the Site for a large, national fitness center tenant.
- **Former Service Station – Patterson, New Jersey.** Project Manager for the implementation of a groundwater remediation injection program to address petroleum contamination at a former service station located in Paterson, New Jersey for a major transit agency. Responsibilities included implementation of a PA and SI to further investigate chlorinated VOCs at this Site. As part of this project, Mr. Kovacs took a lead role in preparing reports and the Permit-by-Rule Request, as well as assisting in satisfying all NJDEP administrative requirements.
- **NJ Transit Active Railyard – Roxbury Township, New Jersey.** Project manager for the investigation of a diesel release at an active railyard in. This release was caused by a faulty underground pipe located in the locomotive fueling area. The diesel release resulted in a free-product plume, groundwater impacts, and impacts to a subsurface drainage culvert and a nearby lake. Responsibilities included the development and coordination of a field investigation program, coordination of routine gauging and free-product recovery events, correspondence with NJDEP, and preparation of a baseline ecological evaluation. Additionally, Mr. Kovacs supported the Site LSRP in meeting all NJDEP administrative requirements.

Facility Demolition/Decommissioning

- **Former Pharmaceutical Manufacturing Facility Decommissioning, Brooklyn, New York.** Project Manager for the interior decontamination and decommissioning of a 700,000+ square foot former manufacturing facility located in Brooklyn, New York to allow for redevelopment of the building for commercial, retail, and light industrial use, and use as a movie studio, and for local food businesses. This redevelopment has earned significant positive press, as it is considered a highly beneficial reuse for the community. This project included the development of decontamination and decommissioning work plan, technical support of bidding process, and full time onsite engineering support of the entire project.

  Decontamination and decommissioning activities included removal/cleaning of hundreds of air handling units and dust collector units impacted with manufacturing dusts and residues, as well as thousands of feet of intricate vacuum, ventilation, and dust collection lines. This project also included the removal of concrete impacted with metals, PCBs, and/or VOCs, selective interior demolition, and decontamination of former laboratory, milling, compounding, blending, and packaging areas, as well as asbestos abatement. At the

conclusion of this project, a Final Report was prepared, documenting in detail the extensive work completed and the work plan objectives were achieved.

- **Former Pharmaceutical Manufacturing Facility Demolition, Brooklyn, New York.** Project Manager for the demolition of two former manufacturing buildings in Brooklyn, New York. Both buildings were impacted with hazardous levels of PCBs, mercury, and lead. Responsibilities included in situ waste characterization of building materials, oversight of hazardous waste removal, completion of waste manifests, and full-time Community Air Monitoring during all demolition activities. Additionally, Roux Associates performed daily inspections and monitoring to ensure the protection of a nearby elementary school and prepared a completion report at the conclusion of the project.
- **PCB Building Material Remediation.** Principal-in-Charge for the investigation and TSCA remediation of PCB containing paint in a former manufacturing area. This location (approximately 2,000 square feet in area, and two stories in height) was found to contain PCBs in the paint matrix at concentrations as high as 10,000 parts per million. The underlying building material (brick, concrete, and terra cotta) was also found to be impacted with PCBs from the paint. Responsibilities included preparation of a Self-Implementing Notification and Alternative Decontamination Methods and Verification Sampling Work Plan to remediate the PCBs under the TSCA regulatory framework. This project also included providing field oversight of the PCB remediation, completion of the extensive verification sampling program of the underlying porous building material, and collection of confirmation air samples and confirmation wipe samples outside of the exclusion zone to confirm proper function of all critical barriers. Following the successful completion of the project, a Final Report was prepared and submitted to USEPA documenting the entire project in detail.

Expert/Insurance Litigation Support

- Consulting Fact Witness for an insurance litigation claim where insured was seeking to be reimbursed for more than $15 million of previous environmental investigation/remediation costs. Mr. Kovacs responsibilities included a formal deposition and testifying in US District Federal Court – Eastern District of New York. Case resulted in favorable ruling for our client.
- Consulting expert for a PRP to the Gowanus Canal Superfund Site, Brooklyn, New York. Evaluated all RI data, performed fate and transport analysis, and evaluation of historic site operations to support facility *de minimis* status.

PROFESSIONAL TRAININGS

OSHA 40-Hour Health and Safety Course (29 CFR 1910.120)

OSHA 8-Hour Health and Safety Refresher Course (29 CFR 1910.120)

PUBLICATIONS

Significant Acceleration of Time Frame to Closure via Transition from Long-Term Biological Treatment to ZVI/EVO Injection, Kovacs, R., Senh, S., Silverstein, W., Moss, D., Kelley, R., Proceedings of the Tenth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, 2016.

Strategy to Overcome Sub-Slab Depressurization System Design and Operational Challenges in an Existing Building With Sensitive Tenant Use, Henke, R., Kovacs, R., Kaiser, D., Proceedings of the Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, 2022.

PROFESSIONAL PROFILE

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EDUCATION

MEng, Biological and Environmental Engineering, Cornell University
BS, Biological and Environmental Engineering, Cornell University

PROFESSIONAL LICENSES

Professional Engineer, New York #088403

Paul Martorano, PE

Technical Director

EXPERIENCE SUMMARY

Mr. Martorano is a registered Professional Engineer with over 20 years of experience. He specializes in providing comprehensive services in design, construction, cost estimating, and program and project management for a wide range of environmental remediation and permitting projects. Experience includes Technical Director at Roux, April 2024 to present; Principal Environmental Engineer at Arcadis, 2012 to 2024; Staff Environmental Engineer at D&B Engineers and Architects, 2004 to 2011.

TECHNICAL SPECIALTIES

Mr. Martorano has a strong background in managing, scoping, budgeting, and implementing projects for both public and private sector clients. His expertise includes groundwater and soil vapor engineered treatment systems, excavation, and off-site disposal, in situ biodegradation, and abatement/demolition. His extensive experience includes treatment technologies for emerging contaminants such as 1,4-dioxane, PFAS, and VOCs. He is well-versed in digital tools for design and construction, financial estimating and reserve forecasting, multi-disciplined design management, waste characterization, and NYSDEC reporting.

REPRESENTATIVE PROJECTS

- **Design, Construction Management and Design During Construction, Groundwater Pump and Treat System Construction, Confidential Client, Long Island, New York**. Lead engineer for a large scale $40M, 3.6 MGD groundwater pump and treat system. System was installed in a 3,500 square foot PEMB with brick façade and associated building systems (electrical, HVAC, fire, sanitary, plumbing). The system treated for 1,4-dioxane (hydrogen peroxide/ozone AOP with pH adjustment), chlorinated solvents (AOP with LPGAC), and solids (horizontal pressure filtration, inclined plate clarifier, volute press). Remedial wells, vaults, and 2-miles of dual-walled HDPE piping with leak detection were installed throughout residential neighborhoods. Work was managed with a digital 3D BIM model, to easily coordinate the multi-disciplined design, create a 4D schedule to visualize the workflow and ensure all elements were properly scheduled, and create presentation-ready material for the client and public. Design and construction included permitting with the Town, Fire Marshal, Department of Health and NYSDEC and support for public meetings. Full construction management services (submittal review, RFI management, delegated design review, Change Order management, resolution of design-based conflicts) were also provided. A Construction Certification Report, Operation Maintenance and Monitoring Manual, and Site Management Plan were completed and submitted at the project conclusion in 2023.

- **Design and Procurement Services, PFAS Water Treatment System, Balt MAES AEC BRAC, Vint Hills, Virginia.** Design manager and lead engineer for a PFAS water treatment system for a potable supply well. Lead and coordinated the design process from the initial 30 percent design, though the 100 percent complete Issued for Construction package. Managed various lead engineers in their respective disciplines, to ensure the preparation of an accurate, cost effective, and safe design. The design utilized a digital 3D BIM model platform, which provided for seamless integration of the various engineering work products, checked for conflicts in a 3D space to minimize the potential for construction field issues, and ultimately provided a tool to better visualize the entire project from start-to-finish. Design work was completed on an expedited schedule, given pending commercial construction that would increase the overall water demand in the area and to meet client budget requirements. Procurement work for the building, equipment and subcontractors was also completed in support of the

construction and included preparation of respective bid scopes of work and bid tables, response to bidder questions, and summary of the bids received.

- **Construction Oversight and Management, Landfill Redevelopment, New York City Dept. of Parks & Recreation, Staten Island, New York.** Project construction management and quality assurance services for the $30M Phase I development of the North Park section of Fresh Kills Landfill. Work included management and oversight of two full-time resident engineers and Construction Quality Assurance inspection and testing for environmental capping and landfill infrastructure modifications. Oversight included: source approval, sampling, and inspection of all imported fill materials in accordance with NYSDEC Part 360; Storm Water Pollution Prevention Plan (SWPPP) inspections and reporting; SPDES monitoring, sampling, and reporting; review and processing of submittals, payment applications, RFIs, Change Orders, Schedule updates, and other project deliverables; and management of construction progress meetings. A Site Management Plan and Construction Certification Report as the "Engineer of Record" were completed and submitted to the NYSDEC at the project conclusion in 2023.
- **Construction Management and Design During Construction, Removal and Installation of Fuel Tanks, NYS Parks, Recreation and Historic Preservation, Sunken Meadow State Park, New York.** Construction management, design administration, and environmental quality control services for removal and disposal of petroleum bulk storage USTs and replacement with concrete reinforced ASTs. Advised and supported all environmental aspects for the project, including notification to NYSDEC, oversight of tank removal and decommissioning activities, endpoint sampling management, reviewing laboratory results against NYSDEC Part 375, and negotiating with regulatory agencies. Work also included review and response to contractor submittals, resolution of RFIs, coordination with contractor and vendors on Shop Drawings and delegated design submittals, and resolution of design-based conflicts that required revisions to the original Contract. Preparation of a final Tank Closure Report was completed and submitted at the project conclusion in 2023.
- **Construction Oversight and Management, Excavation and Off-Site Disposal, Glen Cove Community Development Agency, Glen Cove, New York.** Construction oversight and management of soil excavation and off-site disposal. Responsible for project management and engineering certification of the site work. Worked with the City's contractor to execute the work as specified and designed and coordinated with NYSDEC and USEPA. Site work included: surface water/sediment controls; dust, chemical, and asbestos air monitoring; contaminated soil excavation and disposal; bulkhead stabilization; fill material chemical and geotechnical sampling; unknown gasoline UST removal, disposal, and closeout; asbestos and lead-based paint abatement; and building demolition. The work also included the review and approval of all contractor submittals, weekly progress meetings, approval daily field activity reports, and review and certification of Contractor payment applications. A Final Engineering Report, in accordance with DER-10 and Part 375, was completed and submitted at the project conclusion.
- **Construction Oversight and Management, Storage Tank Removal and Disposal, Orange County, Chester, New York.** Construction oversight and management of AST and UST removal and disposal at the Glenmere Lake Brownfields Site. Work was upload of Glenmere Lake, a drinking water source for the Village of Florida, a wetland, and a habitat for a NYSDEC endangered species (Northern Cricket Frog). Project involved working with the City's contractor to execute the work as specified and designed, as well as coordination with the NYSDEC. Site work included: surface water/ sediment controls; endangered species controls and monitoring; dust and chemical air monitoring; contaminated soil excavation and disposal; backfill material chemical sampling, installation, compaction, and geotechnical testing; and tank removal, disposal, and closeout in accordance with NYS PBS permitting and NY Spills closure requirements.
- **Construction Oversight and Management, Soil Excavation and Off-Site Disposal, Long Island Railroad (LIRR), New York.** Construction oversight and management in support of metals-contaminated soil excavation and off- site disposal. Project was completed as part of a NYS Voluntary Cleanup Agreement. Site work included: surface water/sediment controls; dust and chemical air monitoring; contaminated soil excavation and disposal; fill material chemical and geotechnical sampling; and Underground Injection Control closeout of cesspools, septic systems, and drywells, in accordance with USEPA requirements.
- **Construction Oversight and Management, Soil Excavation and Off-Site Disposal, NYSDEC Bouchard Junkyard Site, New Lebanon, New York.** Construction oversight and management of PCB-contaminated soil excavation and off- site disposal. The Site was located adjacent to a Federal and State wetland. The project involved the characterization and disposal of over 44,000 cubic yards of soil and wetland sediment contaminated with hazardous and non-hazardous level of PCB's, including site and wetland restoration. Site work included: surface water/sediment controls; dust and chemical air monitoring; contaminated soil excavation and disposal; and fill material chemical and geotechnical sampling.

- **Construction Monitoring and Inspection, Sub-Slab Gas Vapor Barrier & Depressurization Systems, New York City School Construction Authority, PS48Q & PS3Q, Queens, New York.** Third-party inspection and oversight of environmental systems and components at several existing and new NYC public schools. Work involved multiple detailed inspections of contractor-installed sub-slab gas vapor barrier and depressurization systems to ensure compliance with regulatory, contract and client requirements, and preparation of detailed field activity reports to document findings.
- **B204 Remedial Action, Port Authority of NY & NJ, Jamaica, New York.** Oversight of fuel-oil contaminated soil remediation, including excavation and in situ biological degradation. Work was conducted as part of a property redevelopment at JFK Airport. Responsibilities included meetings with the client and property developer, oversight of excavation, endpoint sampling, and application of sulfate salts to facilitate aerobic biological oxidation of residual fuel oils at the groundwater interface. Upon completion of the work, field GPS assessment of the excavation extents was completed, and a final remediation report was issued to the client and regulatory agency.
- **Solid Waste Management Unit Decontamination, International Business Machines, East Fishkill, New York.** Field project engineer responsible for overseeing the decommissioning and cleaning of 50+ solid waste management units, within five months. The work included scoping and management of the entire field project, coordination with and scheduling of cleaning subcontractor, leading team project meetings with various client representatives and subcontractor, and rinse sampling the cleaned units. Upon completion, a final report with certifications was submitted to the NYSDEC to document the closure of the units.
- **Feasibility and Conceptual Design Assessments, 1,4-Dioxane/VOC Plume Remediation, Confidential Client, New York.** Project engineer and task manager for preparation of remediation construction cost estimates in support of the client's existing and future environmental liabilities. Cost estimates ranged in value from $500,000 to greater than $50,000,000, and included the coordination and management of multiple sub-discipline estimates (civil, environmental, mechanical, electrical) and review of various remedial technologies, which were ultimately consolidated into one, concise cost estimate. All estimates considered various alternatives, included preparation of a conceptual site and system layout, and were prepared under an expedited schedule, to support the client's internal strategy and business decisions.
- **Demolition and Hazardous Materials Abatement Design, New York State Department of Parks, Recreation and Historic Preservation, Kings Park Psychiatric Center, New York.** Project engineer for the design of demolition and hazardous materials abatement of 13 buildings at the former Kings Park Psychiatric Center. Project involved the on-site assessment of 13 structures/buildings, extensive review of as-built and historical files for the property to determine special requirements for the demolition, assistance with hazardous material survey and sampling, oversight of field work to assess former steam tunnels construction, oversight of core drilling of building foundations/walls to determine if asbestos containing materials were present, and preparation of detailed contract specifications and drawings to support bidding of the abatement and demolition work.
- **Program and Project Management, NYS Superfund Environmental Remediation Site, Confidential Client, New York.** Program management, project management and design-lead services related to a large and complex NYS Superfund Environmental Remediation Site on Long Island, NY. The program averaged $3-4M on a routine yearly basis. As a lead for this program, Mr. Martorano was responsible for budgeting and scoping work orders, coordinated and communicated with the client on day-to-day items, prepared updated quarterly 30-year financial forecasts for the entire program, and acted as one of a few lead professional engineers, to provide QC review and certification of engineering deliverables.
- **Remedial Technology Evaluation and Cost Estimating, Confidential Client, New York.** Remedial technology evaluation and cost estimate for a commercial/industrial site with VOC, PCB and Metal soil impacts from historic site operations. The evaluation considered various traditional and innovative remedial alternatives, including in situ thermal desorption, electrical resistive heating, ex situ thermal desorption, excavation/disposal, in situ solidification and stabilization (ISSS), and soil washing. At the conclusion of the evaluation, an option was proposed to remediate the VOC impacts with ISSS and the PCB & Metal impacts with soil washing, which was estimated to reduce the original remedy cost from an estimated $54 million to $12 million. Final deliverable included a detailed cost breakdown and a high-level cost estimate summary.
- **Remedial Technology Assessment and Selection, Brookhaven National Laboratory, Upton, New York.** Remedial technology assessment for a closed trap and skeet range. Historic usage resulted in ~2,100 pounds of lead deposited on the surface of the range, annually. The assessment reviewed excavation, soil washing, stabilization and chemical extraction. Technologies were evaluated based on their ability to meet NYSDEC requirements. The most

protective and cost effective option utilized a combined approach of in situ stabilization of hazardous areas, followed by excavation and off-site disposal.

- **Groundwater & Soil Vapor Extraction Treatment Systems Operation, Maintenance and Monitoring (OM&M), Various Clients.** Management and engineering quality control support related to OM&M of groundwater (40 gpm to 2,500 gpm) and soil vapor extraction systems. Groundwater systems utilized air stripping (VOCs) or advanced oxidation (1,4-dioxane) for groundwater and vapor phase granular activated carbon (some with steam regenerative solvent recovery) or potassium permanganate zeolite for air treatment. Work included response for alarms and troubleshooting, summary reports for identified O&M issues, field digital data collection, and SCADA programming with automatic data congregation, management, and output reporting. Quarterly and annual reports were also prepared and submitted.
- **Operation, Maintenance and Monitoring, Groundwater Extraction and Treatment, NYSDEC Franklin Cleaners Site, Hempstead, NY & Active Industrial Uniform Site, Lindenhurst, New York.** Project engineer responsible for operation, monitoring and maintenance of the groundwater pump and treatment system at two NYSDEC Class 2 Inactive Hazardous Waste Site. Initially, Mr. Martorano was responsible for performance monitoring activities at the site which included weekly system monitoring, bi-weekly sampling of influent and effluent water and air streams, and scheduling and oversight of subcontractor maintenance activities. Reports summarizing all chemical analysis, groundwater monitoring trends, system performance and maintenance activities, as well as recommendations to improve the overall treatment system performance, were completed and submitted to the NYSDEC on a quarterly schedule. Additional work completed in support of the Franklin Cleaners Site included the preparation of the Final Remediation Report for the on-site soil vapor extraction/air sparge system and remedial construction oversight for the installation of an on-site sub-slab depressurization system. Reporting deliverable included a Site Management Plan and Periodic Review Report, in accordance with NYSDEC DER-10.
- **Construction Oversight, Sub-Slab Depressurization, NYSDEC 34th Avenue/62nd Street Plume Site, Jackson Heights, New York.** Project field engineer responsible for the installation of an active sub-slab depressurization system at the NYSDEC 34th Avenue/62nd Street Plume Site. Work involved oversight of the system installation, review of contractor's submittals and final review and approval of the work.
- **Site Closure Reporting, National Grid, Glenwood Landing, New York.** Project engineer for the preparation of site closure reports for the remediation of a former manufactured gas plant site in Glenwood Landing, NY. Reports included a Final Engineering Report and Site Management Plan in accordance with NYSDEC DER-10. Also assisted with the preparation of the Environmental Easement for the property, to maintain the existing use, restrict future soil excavation activities at the site and minimize exposure to contaminated soil remaining on-site below soil and clay caps.

PROFESSIONAL TRAININGS

40-Hour Health and Safety Training for Hazardous Waste Sites (29 CFR 1910.120(e))

8-Hour Refresher for Hazardous Waste Operations Training (29 CFR 1910.120)

10-Hour OSHA Construction

Confined Space Entry Training (29 CFR 1910.146)

Asbestos Awareness Training

PROFESSIONAL PROFILE

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EDUCATION

MS, Geographic Information Systems, Johns Hopkins University, 2016
BA, Geology, State University of New York at Geneseo, 2013

Jessica J. Lam

Project Geologist

EXPERIENCE SUMMARY

Eleven years of experience: Project Geologist at Roux, Islandia, New York; Senior Project Manager at Advanced Cleanup Technologies, Inc.; Environmental Program Specialist III at Alaska Department of Environmental Conservation.

TECHNICAL SPECIALTIES

Project and field management of properties/sites enrolled in the USEPA Superfund, NYSDEC Superfund and Brownfield Cleanup, and NYCOER Voluntary Cleanup Programs. Development and implementation of site investigations and remedial actions in accordance with federal, state, and local regulatory program requirements. Environmental due diligence support for property transactions/refinancing through Phase I and II Environmental Site Assessments. Performance of soil vapor intrusion investigations and vapor mitigation system design. Compliance and regulatory support for petroleum bulk storage, major oil storage, and chemical bulk storage facilities. Dry well and septic system sampling design and closure.

Field management of soil, groundwater, soil vapor, and ambient air sampling; dry well and leach pool sediment sampling; waste characterization sampling; small- and large-scale soil excavations including source contamination/hotspot removal; redevelopment and construction oversight; and waste transport and off-site disposal coordination.

REPRESENTATIVE PROJECTS

- Project manager and environmental professional for several Phase I and II Environmental Site Assessments of residential, commercial, and industrial properties throughout the Metropolitan New York area. Responsibilities include environmental due diligence support for financial institutions/lenders, developers, real estate investors, commercial and industrial operators, and individual real estate sellers and purchasers. Related activities included regulatory agency interaction, site reconnaissance, database management, historical records review, report preparation, and recommendations for additional investigation or remediation if warranted based upon findings. Other related activities include underground storage tank investigations, soil vapor intrusion evaluations and mitigation systems, historical document reviews at state/local agencies, and development of remedial cost estimates.
- Project manager for ongoing remedial investigations and OM&M activities for a large energy company servicing New York City and Westchester. Responsibilities include delineation of new releases and legacy spills from electrical equipment, feeders, and transformers; development of remedial approaches and strategic planning of site investigations within active power generation stations containing critical infrastructure; regulatory compliance or closure support of decommissioned power generation stations; and routine LNAPL monitoring and recovery events as part of OM&M.
- Project Manager for the investigation, remediation, and ongoing redevelopment of a former industrial property with historical auto repair operations in Bronx, New York, as part of the NYSDEC Brownfield Cleanup Program. Responsibilities include field management, report preparation, and regulatory agency correspondence. Associated activities include development and implementation of the Remedial Investigation Work Plan; Interim Remedial Action Work Plan; Remedial Investigation Report and Remedial Action Work Plan; Supplemental Groundwater Remediation and Soil Vapor Sampling Work Plan; and preparation of the Final Engineering Report. Other activities include monthly and daily

reporting to NYSDEC, coordination of fact sheets for public mailing, and developer support to meet 421-a requirements.

- Project Manager of site investigations, ongoing OM&M, and compliance inspections for a housing development in the East New York neighborhood of Brooklyn, New York. The development has its own power plant and is registered as a NYSDEC MOSF. Responsibilities include routine fluid elevation monitoring, groundwater sampling, and underground storage tank testing for the development's power plant. Other activities include preparation of an amended Spill Prevention, Control, and Countermeasure Plan to satisfy MOSF requirements; preparation of a Spill Prevention Report to comply with NYSDEC Chemical Bulk Storage regulations; development and implementation of a Site Assessment Work Plan for MOSF Closure; and preparation of a Site Assessment Report for MOSF Closure.
- Project Manager of an ambient air monitoring investigation for a heliport in Manhattan, New York. Responsibilities included preparation and implementation of a Site Monitoring Plan. As part of the investigation, ambient air monitoring was conducted at on-site and off-site locations using handheld equipment to detect total volatile organic compounds, oxygen, nitrogen dioxide, and carbon monoxide. Additionally, ambient air samples were collected concurrently from on-site locations to analyze for benzene, 1,3-butadiene, and acetaldehyde.
- Project Manager and litigation support involving chlorinated solvent groundwater plume associated with a former chemical facility in Southern California. Responsibilities include historical document review, database support, and data mapping and interpretation.
- Senior Project Manager of remedial investigation activities to delineate on-site and potential off-site chlorinated solvent impacts to soil, groundwater, and soil vapor at a former commercial dry cleaning facility in Queens, New York, as part of the NYSDEC Brownfield Cleanup Program. Responsibilities included preparation of a BCP application and development of a Remedial Investigation Work Plan and Interim Remedial Measure Work Plan.
- Senior Project Manager for the investigation, remediation, and redevelopment of vacant lot in the Greenpoint neighborhood of Brooklyn, New York, as part of the NYCOER VCP Program. The proposed development consisted of a mixed-use building with affordable housing units and was adjacent to Former NuHart Plastic Manufacturing, a USEPA Superfund site. Responsibilities included strategic environmental consulting support during the remedial investigation and remedial action while satisfying the hazardous materials E-Designation. Other activities included preparation of a Remedial Investigation Report and development of a Remedial Action Work Plan.
- Senior Project Manager for the remedial investigation of an active dry cleaning facility in Bronx, New York, as part of the NYSDEC Brownfield Cleanup Program. Responsibilities included development of the Remedial Investigation Work Plan to evaluate on-site and potential off-site chlorinated solvent impacts to soil, groundwater, and soil vapor.
- Senior Project Manager for remedial investigation activities at a former dry cleaning facility in Queens, New York, as part of the NYSDEC Brownfield Cleanup Program. Responsibilities included development and implementation of a Remedial Investigation Work Plan to evaluate on-site and potential off-site impacts to soil, groundwater, and soil vapor.
- Senior Project Manager for the remedial action of a property in the Gravesend neighborhood of Brooklyn, New York, as part of the NYCOER Voluntary Cleanup Program. Responsibilities included the preparation and implementation of the Remedial Action Work Plan and preparation of the Remedial Action Report. Field management activities included construction oversight, soil management, and oversight of vapor barrier installation as part of the remedial action while satisfying the hazardous materials E-Designation. Provided developer support and applied for grants through the NYC BIG Program.
- Senior Project Manager for a spill closure investigation at former gasoline filling station in the Flushing neighborhood of Queens, New York. Responsibilities included development and implementation of a spill investigation to delineate petroleum-impacted soil and groundwater from historical fueling operations. Field management activities included quarterly groundwater monitoring. Prepared and submitted a Spill Closure Report summarizing soil and groundwater data to NYSDEC.

PROFESSIONAL TRAININGS

OSHA 40-hour HAZWOPER

OSHA 8-hour Refresher

OSHA 30-hour Construction Safety and Health

Long Island Railroad Contractor Safety and Roadway Worker Protection

Red Cross First Aid and CPR

PROFESSIONAL PROFILE

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EDUCATION

BS, Earth and Environmental Science, Lehigh University, 2014
BA, Biology, Lehigh University, 2014

Rachel Henke

Senior Scientist I

EXPERIENCE SUMMARY

Nine years of experience: Senior Scientist I, Project Scientist, Staff Scientist, and Staff Assistant Scientist, Roux, Islandia, New York.

TECHNICAL SPECIALTIES

Design, implementation, and management of Remedial Investigations and Remedial Actions for sites in regulatory programs including the United States Environmental Protection Agency Superfund Program, the New York State Brownfield Cleanup Program, and the New York City Office of Environmental Remediation Voluntary Cleanup Program; Management of due diligence Phase I and Phase II Environmental Site Assessments; Preparation and management of Brownfield Cleanup Program Applications, Remedial Investigation Work Plans, Remedial Investigation Reports, Remedial Action Work Plans, and Final Engineering Reports; Investigation and evaluation of petroleum, chlorinated solvent and per- and poly fluoroalkyl substances (PFAS)-related contamination; Management of large-scale soil excavation projects including demolition, waste characterization, and construction activities.

REPRESENTATIVE PROJECTS

- Project manager for the Remedial Investigation and Remedial Action implementation associated with former dry cleaner and gas station releases at a 65,000 square foot property in the Bronx, New York. The site was enrolled in the New York State Brownfield Cleanup Program (NYS BCP) and successfully achieved a Track 4 Clean-Up. Responsibilities included the design and management of a Remedial Investigation. As part of this work, soil borings, monitoring wells, and soil vapor monitoring points were installed, and hydrogeologic cross sections were prepared. Additionally, as part of this project, a Remedial Action Work Plan, Final Engineering Report, Fact Sheets, and Monthly Reports were prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) requirements. Current redevelopment plans include a mixed-use development with parking and limited landscaping.
- Project manager for a site enrolled in the NYSDEC BCP with chlorinated solvent contamination is sub-slab vapor and indoor air. Technical responsibilities included design and management of the Remedial Investigation and Interim Remedial Measure (IRM). The IRM included the design of a sub-slab depressurization system within the footprint of the existing site building. Following completion of the IRM, the site will be occupied by an educational facility for children with special needs.
- Project Manager providing technical strategy/ consulting on behalf of a potential responsible party (PRP) participating in a Federal Superfund Remedial Investigation/Feasibility Study (RI/FS) at an industrial waterway in Brooklyn, New York. Technical responsibilities include historical file review, litigation support, and public relations strategy development. Project management responsibilities include management of annual budget exceeding $1 million, management of various technical subcontractors on behalf of client and routine communication with litigation team.
- Project Manager for the preparation and implementation of an extensive Phase II Environmental Site Assessment Work Plan at a former ink ribbon and carbon manufacturer in Glen Cove, New York on behalf of a prospective purchaser. The Phase II ESA included groundwater, soil, and soil vapor sampling to investigate the potential presence of contamination at the Site associated with its historical industrial operations and listing as a State Superfund Site.

- Project manager of redevelopment project in New York City. The project consists of the demolition of an existing hotel located over an active commuter rail terminal and the excavation of soil/bedrock to allow for foundation installation. Environmental considerations on the project include site assessment, remediation design and oversight, soil characterization for offsite disposal. Coordinated with NYCDEP, Metropolitan Transit Authority, Metro North Railroad and other project stakeholders concerning community protection and monitoring concerns.
- Project manager responsible for the preparation and field implementation of a soil characterization work plan and a chlorinated solvent delineation work plan for a former Manufactured Gas Plant (MGP) site in Brooklyn, New York. The operation of the MGP led to contamination of subsurface soil and groundwater by coal tar, a byproduct of the gas manufacturing process, and as a result, the NYSDEC issued a Record of Decision specifying the required remedy for the Site. The remedy will include soil excavation and offsite thermal treatment, a sheet pile barrier wall, a vapor barrier and basement ventilation system. A comprehensive air monitoring program was conducted due to the concerns over coal tar residue emissions and odors on the surrounding community.
- Project Manager for an inactive solid waste landfill site in upstate New York that was investigated under the NYSDEC Inactive Landfill Initiative. Responsibilities included management of a groundwater investigation to examine the potential presence of per- and poly fluoroalkyl substances (PFAS) contamination.
- Project support for ongoing large and complex mixed use development of a 92-acre Site located in Syosset, New York. The site was accepted into the New York State BCP and has an extensive environmental history, including former use as a wire and conduit manufacturer (former NYS Inactive Hazardous Waste Site), former landfill (currently a Federal Superfund Site), and town DPW facility. Activities completed included compiling numerous historical environmental reports prepared for the site; interacting with NYSDEC, USEPA, NCDOH; completing a supplemental soil investigation (including extensive use of XRF Technology, as metals are the compound of concern); conducting a groundwater investigation (water is over 100 feet deep); and managing a Remedial Investigation that included a groundwater investigation to evaluate the potential presence of per- and poly fluoroalkyl substances (PFAS) contamination.
- Project Manager for the redevelopment of a 2.7-acre site in the South Ozone Park region of Queens, New York. The project was enrolled in the NYC OER Voluntary Cleanup Program (VCP) to address an E-designation on the property. During construction, over 35,000 CY of soil was transferred through the Clean Soil Bank, and the Site is on track to obtain a Track 1 Cleanup. When constructed, the project will be the first vertical logistics facility to serve the JFK Market.
- Project Manager for the redevelopment of a strip mall in East Orange, New Jersey that contained seven former and one operating dry cleaner, three former fueling stations, and a former automotive repair shop. Project scope included completing a New Jersey specific Preliminary Assessment and Site Investigation, assessing indoor air and IECs, and preparing and implementing a Remedial Investigation Work Plan and Remedial Action Work Plan.
- Project Manager for the redevelopment of a 3.1-acre site in the St. George region of Staten Island, New York. The project was enrolled in the NYC OER VCP, which transferred over 20,000 CY of soil through the Clean Soil Bank and will obtain a Track 1 Cleanup. When constructed, the project will include 62,000 sq ft of retail space, 109 residential apartments, a 180-room hotel, 125,000 sq ft of subgrade parking, and four rehabilitated historic U.S. Lighthouse Depot buildings.
- Project Manager for a site in the NYSDEC Spills Program in Brooklyn, New York. Responsibilities included a remedial investigation to delineate the nature and extent of the subsurface contamination; implementing an in situ chemical oxidation injection program utilizing RegenOx™ oxidant compound, which was injected into 28 injection points throughout the site; and designing and managing a hot spot excavation remedial measure to remove the source area that served as a continuing source of groundwater contamination.
- Project Manager for a high-end residential redevelopment project in Mineola, New York. Responsibilities included designing and implementing an in situ waste characterization program, excavation support, and the closure and abandonment of 10 Class V drywell structures. The drywell abandonment was conducted in accordance with the USEPA Underground Injection Control Program as administered by USEPA Region 2 and the Nassau County Department of Health (NCDOH). The project involved coordination with the client, the client's on-site subcontractor, the NCDOH, and the USEPA to successfully complete the job. A work plan and summary report were prepared to satisfy NCDOH and USEPA's requirements and obtain a No Further Action Letter.
- Project Manager for a high-end residential redevelopment project in New Rochelle, New York. Responsibilities included designing and implementing an in situ waste characterization program and excavation support. Despite being outside of the five boroughs of New York City, the Site was allowed to transfer soil through the NYCOER Clean Soil Bank. Responsibilities included coordination with the client, the client's on-site subcontractor to successfully complete the job.

- Project Manager of a site investigation project in Lynbrook, New York immediately downgradient of a 11.5-acre cemetery. Evaluated source of contaminants as a result of cemetery operations and historical site use including a manufactured gas plant and former dry cleaner. Collected soil, soil vapor, and groundwater samples to support delineation of pesticides and herbicides suspected to be emanating from the cemetery.
- Project Manager for the remediation of four drywell structures at a former pharmaceutical facility in Hauppauge, New York. The drywell remediation project was conducted in accordance with the Suffolk County Article XII requirements and entailed coordination with Suffolk County Department of Health Services (SCDHS). This project was unique in that the drywell sediment characterization and remediation work had to be completed within one month of receiving preliminary characterization data from SCDHS, with a threat of monetary penalty if this schedule was exceeded. The remediation and Remediation Summary Report were completed in the timeframe specified by SCDHS.
- Project Manager for the on-going site management of a redevelopment project in Corona, Queens, New York. The Site formerly operated as an automobile dealership and was accepted into the NYSDEC Brownfield Cleanup Program. A conditional Track 1 Cleanup was successfully completed at the Site in 2015, and the Site is now subject to a Site Management Plan (SMP). The final remedial design and SMP include a vapor barrier, active ventilation systems in the proposed sub-grade parking levels, and biannual groundwater monitoring to address the remaining CVOC contamination in regional groundwater.
- Project Manager and support to Expert Witness for a case on behalf of a PRP (Defendant) at a former landfill in upstate New York. The site is in the state superfund program and contained waste from Love Canal. Downgradient receptors include a residential community. The case involves the evaluation of mass contribution of specific chemicals, timing of disposal, and cost allocation. Complaint Index No. E161116/2017; Supreme Court of the State of New York, Niagara County.
- Support to Expert Witness for an on-going case between a major insurance carrier and a large multinational chemical manufacturer. The case involved categorizing past costs of 12 chemical sites across the country. Assisted in the preparation of the expert report on behalf of the insurance carrier (Defendant). Complaint No. 84 Civ. 1968 (JSR); U.S. District Court, Southern District of New York.
- Field Manager responsible for implementation of a Remedial Investigation Work Plan (RIWP) and Waste Characterization Sampling Plan at a 2.98-acre NYS BCP site containing chlorinated solvents, heavy metals, and petroleum compounds in soil, soil vapor, and groundwater over one city block in Astoria, New York. Responsibilities included soil and soil vapor sampling in addition to groundwater sampling for emerging contaminants (1,4-dioxane and PFAS).
- Field Manager for a site in the NYS BCP that also required a RCRA compliant facility closure. The site is a former paint factory located in Long Island City, New York. Due diligence environmental investigations determined historical site operations adversely impacted the subsurface, including a LNAPL plume in addition to petroleum hydrocarbon impacts to the soil and groundwater. Responsibilities included: 1) oversight of RCRA closure activities at the site that included emptying, cleaning, and scrapping 65 ASTs/vessels, decontaminating approximately 30,000 square feet of hazardous waste storage areas within the Paint Factory Building and collecting compliance samples, and 2) oversight of implementation of the RAWP, which included a large excavation requiring SOE and completion under a tent due to odor concerns, multiple ISCO injections, removal/ abandonment of USTs with a total capacity of over 200,000 gallons, and installation of a LNAPL recovery system.
- Sampling team leader tasked with the rapid assessment of soils outside 40 residential and sensitive-use properties located near the former battery recycling facility in Vernon, California. Lead emissions from the former facility are suspected of affecting surface and near-surface soils in surrounding areas as a result of aerial deposition. Responsibilities included conducting soil sample screening on each property at up to 15 locations on lawn areas, bare soils, garden areas, play areas, and roof drip-zones using an X-ray fluorescence (XRF) analyzer to submit the two largest sampling areas for confirmatory laboratory analysis.
- Field manager in charge of Pre-Design Investigation and Waste Characterization sampling event for a New York State BCP project in Brooklyn, New York. The site is an auto dealership with petroleum and chlorinated solvent contamination in soil and groundwater.
- Field Manager for aquifer tests completed at a closed landfill in Holtsville, New York. Field tasks included monitoring groundwater levels with a network of In Situ Level Trolls during a step-drawdown test and during a constant-rate pump test. Aquifer test data were subsequently used to determine hydrogeologic parameters of the aquifer beneath the Site using AQTESOLV software and various methods of analyses.
- Field Manager for a site in the NYCOER VCP. The site is a former gas station located in Manhattan, New York. Historical site operations adversely affected the subsurface through petroleum hydrocarbon impacts. Responsibilities included implementing a Community Air Monitoring Program (CAMP);

managing soils including transportation and disposal; collecting soil samples; and maintaining communication between subcontractors and Roux office support.

- Performed numerous Phase I and II Environmental Site Assessments for due diligence in connection with property transfers for the New York Metropolitan Area.
- Remedial construction manager responsible for soil excavation and waste removal oversight for development in Staten Island, New York. Responsibilities include oversight excavation, organization, and proper handling of waste manifests; performing Stormwater Pollution Prevention Plan (SWPPP) inspections; ensuring compliance with the Site Management Plan; health and safety oversight; and reporting NYCDEP and NYSDEC inspections to the client.
- Field Manager responsible for the implementation of a CAMP during excavation and disposal activities at multiple locations in Manhattan and Queens, New York. Ms. Henke monitored airborne dust and VOCs that were potentially generated by remedial action work activities and reviewed the collected data for exceedances of the New York State Department of Health (NYSDOH) guidelines.
- Site Safety Officer for various remedial investigation sites. Responsibilities include preparation of health and safety plans (HASPs), job safety analysis (JSA) documents development and review, on-site safety meeting management, safety document preparation (Lessons Learned, Near Loss, Field Audits, etc.), and planning/executing corrective actions.
- Assisted in the implementation of a large-scale waste characterization program and remedial investigation for a major redevelopment project in Flushing, New York that is enrolled in NYCOER VCP and E designation programs. The project included the coordination and oversight of an in situ waste characterization sampling of over 450,000 tons of soil and delineating a NYSDEC spill site within the project footprint.
- Assisted in bi-annual soil vapor monitoring round to surveil the largest subsurface free-product plume in North America at a former fuel and oil distribution terminal in Brooklyn, New York. Activities included the collection of soil vapor and ambient air samples from on-site and off-site monitoring wells using EPA method TO 15.

PROFESSIONAL TRAININGS

OSHA 40-hour HAZWOPER Training, 2014

OSHA 8-HOUR Refresher Training, Certificate Current

OSHA 30-hour Construction Safety Training, 2019

New York State Builders Association 4-Hour Stormwater Training, 2016

First Aid and CPR Certified

Loss Prevention System (LPS) Awareness, 8-Hour Certified

Transit Worker Identification Credential Card Holder

Metro North Railroad Contractor Safety and Security Training

NJTransit Contractor Safety and Security Training

Amtrak Contractor Safety and Security Training

PRESENTATIONS

G. Buermann, R. Henke, K. Olear, and A. Scholtz. Reckoning with Microplastics: The Looming Challenges, Pitfalls, and Uncertainties. 36th Environmental & Emerging Claim Manager Association Annual Conference (EECMA). April 21, 2022.

J. Rohrer and R. Henke. Microplastics: California and Beyond?: NGWA Problematic Groundwater Contaminants: More Than PFAS Forum. May 27, 2021.

PROFESSIONAL PROFILE

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EDUCATION

PhD, Environmental Engineering, University of California, 2001
MS, Environmental Science (concentration in environmental chemistry), Indiana University, 1993
BA, Biochemistry, University of Texas, 1991

James Hauri, PhD

Senior Scientist I

EXPERIENCE SUMMARY

Dr. Hauri is a broad-based environmental scientist with more than twenty years of experience in environmental science, engineering, and chemistry. His professional experience includes Roux, Senior Scientist I (2022 – present); Assumption University, Associate Professor (tenured), (2007-2012, 2014-2022) and Assistant Professor (2001-2007); Exponent, Senior Scientist (part-time: 2014-2015) (full-time: 2012-2014); Harvard University, School of Public Health, Visiting Scientist (part time: 2008-2012); CH2M-Hill, Environmental Consultant (2001); San Francisco Estuary Institute, Intern, (1997-1998); and Southwest Research Institute, Scientist (1993-1994).

TECHNICAL SPECIALTIES

Dr. Hauri's multidisciplinary background has included field sampling, environmental analytical chemistry, toxicity testing and data analysis. Much of his work has explored the nexus between the chemistry and ecotoxicity of environmental contaminants.

Dr. Hauri's areas of expertise include:

- Heavy metal speciation and toxicology;
- Environmental data analysis and validation;
- Analysis of ecotoxicology data; and
- Aquatic chemistry and contamination.

REPRESENTATIVE PROJECTS

Chemistry and Toxicology

- **Deep Water Horizon Oil Spill.** Evaluated the appropriateness of new methods to solubilize oil used with toxicity tests during the DWH spill. Compared the composition and concentration changes in polycyclic aromatic hydrocarbons (PAHs) associated with the new preparatory methods with field collected samples in order to determine if the toxicity tests performed were relevant to the actual toxicity expected to be seen in the field.
- **Alameda Corridor Transportation Authority (ACTA).** Provided technical expertise to gain a unique temporary discharge waiver for a multi-billion-dollar construction project in California. ACTA gained a waiver to discharge dewatering effluent during construction into the LA-Long Beach Harbor. The waiver regulated the effluent based on bioavailable (labile) metal concentration rather than total or dissolved concentrations, and then the project ensured non-detect labile metal concentration via the addition of EDTA.

REPRESENTATIVE EXPERT RETENTIONS/APPEARANCES

Analytical Environmental Chemistry

- Knurr, B. and J. Hauri (2021) Connecting Bomb Calorimetry to Environmental Issues: Two Bomb Calorimetry Experiments. Presented at the Fall ACS National Meeting, August 22-26. Atlanta, GA.
- Hauri, J. and B. Niece. (2018) Fingerprinting White Wines with Excitation-Emission Matrix Fluorescence. Poster presented at the Fall ACS National Meeting, August 19-23. Boston, MA.
- Hauri, J. (2017) Variation to the Excitation-Emission Matrix Fluorescence Characterization of Allochthonous Dissolved Organic Carbon due to pH changes. Poster presented 38th Annual Society of Environmental Toxicology and Chemistry National Meeting, 12 - 16 November, Minneapolis, MN.

- J. Hauri and K. Wirzbicki. (2011) Excitation-Emission Matrix Fluorescence Characterization of Dissolved Organic Carbon Leached from Leaves from Various Tree Species. Poster presented at the Society of Environmental Toxicology and Chemistry National Meeting, 13 - 17 November, Boston, MA.
- Miller, M. and J.F. Hauri. (2005) Development of an HPLC/UV Method for the Detection of Ibuprofen in River Water. Poster presented at the National Conference on Undergraduate Research, April 21-23, Lexington, VA.
- Parnass, K. and J.F. Hauri. (2004) Development of an HPLC/UV Method for the Measurement of Environmentally Relevant Concentrations of Ibuprofen. Poster presented at the North Atlantic Regional Chapter of the Society of Environmental Toxicology and Chemistry Meeting, June 9-11, Portsmouth, RI.

Chemistry and Toxicology

- S. Kane Driscoll, J. Hauri, K. Kulacki, A. M. Morrison, M. McArdle, A. Schierz, K. Yozzo, and M. Edwards. (2016) The Influence of Mixing Energy on the Concentration and Composition of Oil in Laboratory Toxicity Tests. Poster presented 37th Annual Society of Environmental Toxicology and Chemistry National Meeting, 6 - 10 November, Orlando, FL.
- Yozzo, K. S. Kane Driscoll, J. Hauri, M. McArdle, and A.M. Morrison. (2016) Review of Current Literature of Cardiotoxicity of Oil to Early Life Stages of Fish and the Use in Injury Assessments. Presentation at 37th Annual Society of Environmental Toxicology and Chemistry National Meeting, 6 - 10 November, Orlando, FL.
- Kane Driscoll, S., R. Wells Whittlesey, J. Hauri, K. Kulacki, A. Schierz, T.L. Morse, A.M. Morrison, and K. Yozzo. (2016) The Influence of Mixing energy on the Concentration, Composition, Toxicity, and Relevance of the Laboratory Toxicity Tests. Poster presented at the Gulf of Mexico Oil Spill and Ecosystem Science Conference. 1-4 February, Tampa Bay, Fl.
- Frazier, K., K. Cushing, and J. Hauri (2010) A visual documentation of acute toxicity in zooplankton. Poster presented at the North Atlantic Regional Chapter of the Society of Environmental Toxicology and Chemistry Meeting, June 2-4, Narragansett, RI.
- Hauri, J.F. and A.J. Horne. (2002) Copper toxicity reduction via EDTA addition: a real-world application. Presentation at the Society of Environmental Toxicology and Chemistry National Meeting, 16 - 20 November, Salt Lake City, UT.
- Hauri, J.F. and A.J. Horne. (2002) Copper toxicity reduction via EDTA addition: a real-world application. Poster presented at the American Chemical Society National Meeting, 18-22 August, Boston, MA.
- Hauri, J.F., K.D. Zoh, A. Steding, and A.J. Horne. (1999) Trinitrotoluene toxicity reduction to Ceriodaphnia dubia by humic acid complexation. Poster presented at the 19th NALMS Annual Meeting, 1-4 December, Reno, Nevada.
- Hauri, J.F., and A.J. Horne. (1997) Toxicity and chemistry of copper in urban runoff from San Francisco Bay creeks. Presented before the CALMS Annual Meeting, November, California.
- Hauri, J.F., and A.J. Horne. (1997) Influence of food on bioavailability of copper in the 7-day Ceriodaphnia dubia bioassay. Poster presented at the 18th SETAC Annual Meeting, 16-27 November, San Francisco, California.
- Hauri, J.F., and A.J. Horne. (1997) Toxicity and chemistry of copper in urban runoff from San Francisco Bay creeks. Presented before the 17th NALMS Annual Meeting, 2-6 December, Houston, Texas

Misc. Environmental Chemistry

- Drumm, E., and J. Hauri (2020) Analysis of Existing Water Quality Datasets of Lake Quinsigamond, Massachusetts. Poster accepted at North Atlantic Regional Chapter of the Society of Environmental Toxicology and Chemistry Meeting, April 13-14, Avery Point, CT. Accepted, but conference was cancelled.
- Hauri, J. (2007) Adapting research for laboratory experiments in undergraduate environmental chemistry courses. Presented at the 234th ACS National Meeting, August 19-23, Boston, MA.
- Kulevich, S. J. Van Doren, and J. Hauri. (2006) Green arsenic remediation. Presented at the 231st ACS National Meeting, March 26-30, Atlanta, GA.
- Hauri, J. and B. Niece. (2005) Removal of Ibuprofen through a Wastewater Treatment Plant. Poster presented Society of Environmental Toxicology and Chemistry National Meeting, 14 - 17 November, Baltimore, MD.
- Hauri, J.F., P. Frank, and A.J. Horne. (1999) Acid mine drainage in rural and urban environments. Presented before the 19th NALMS Annual Meeting, 1-4 December, Reno, Nevada.

PROFESSIONAL AFFILIATIONS

American Chemistry Society (ACS)

Society of Environmental Toxicology and Chemistry (SETAC)

NAC SETAC – board of directors 2005-2008, VP 2008-2009, Pres 2009-2010

PUBLICATIONS

Analytical Environmental Chemistry

Knurr, B. and J.F. Hauri. (2020) An Alternative to Recycling: Measurement of Combustion Enthalpies of Plastics via Bomb Calorimetry. Journal of Chemical Education. V.97, pp 1465-1469.

Niece, B. and J.F. Hauri. (2013) Determination of Mercury in Fish: A Low-Cost Implementation of Cold-Vapor Atomic Absorbance for the Undergraduate Environmental Chemistry Laboratory. Journal of Chemical Education. V.90 (14), pp 487–489.

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Chemistry and Toxicology

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Hauri, J.F. and A.J. Horne. (2004) Reduction in Labile Copper in the 7 Day Ceriodaphnia dubia Toxicity Test due to the interaction with zooplankton food. Chemosphere. v. 56, pp. 717-723.

Misc. Environmental Chemistry

Hauri, J.F., C. Daughton, and R. Klaper. (2016) The Challenge: Establishing Policy in an Uncertain World: What can be done to address emerging environmental contaminants having indeterminate or subtle ecological or human impacts? Environmental Toxicology and Chemistry. V.35(2), pp. 266-270.

Hauri, J.F. and L.A. Schaider. (2009) Remediation of Acid Mine Drainage with Sulfate Reducing Bacteria. Journal of Chemical Education. v. 86 (2), pp. 216-218. Other Publications

Lincoln, R., C. Amarasiriwardena, J. Shine, A. Ettinger, C. Paciorek, J. Hauri, R. Wright, J. Spengler (2011) Meconium as a biomarker for prenatal metals exposure: Methodological considerations and variations in serial samples over time (Diss. Chapter). Biomarkers of Metals Exposure in Two High-Risk Communities. School of Public Health, Harvard University.

Hauri, J.F. (1998) Scoping study of air deposition monitoring information relevant to water quality of San Francisco Bay, Final Report. Bay Area Stormwater Management Agencies Association.

Hauri, J.F., and Alex J. Horne. (1997) Bioavailability and toxicity of heavy metals in urban runoff in simulated natural conditions. University of California Water Resources Center.

APPENDIX B

Roux's Standard Operating Procedures

Date: May 5, 2000

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.

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. Thus, this SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity to as great an extent as possible. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic

container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., TeflonTM) septums. Non-aqueous volatile organic samples should be collected in the same type of vials or in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., TeflonTM). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth, so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

a. Sample bottles are preserved at the laboratory prior to shipment into the field.

b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. Each sample bottle must be placed in an individual Ziploc® bag to protect the label, and placed on ice. The bottles must be carefully packed to prevent breakage during transport. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly

contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory. Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection Agency does not like the use of blue packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased. The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

3.0 EQUIPMENT AND MATERIALS

3.1 General equipment and materials may include, but not necessarily be limited to, the following:

a. Sample bottles of proper size and type with labels.

b. Cooler with ice (wet or blue pack).

c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.

d. Black pen and indelible marker.

e. Packing tape, "bubble wrap," and "zip-lock" bags.

f. Overnight (express) mail forms and laboratory address.

g. Health and safety plan (HASP).

h. Work plan/scope of work.

i. Pertinent SOPs for specified tasks and their respective equipment and materials.

3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:

a. Graduated pipettes.

b. Pipette bulbs.

c. Litmus paper.

d. Glass stirring rods.

e. Protective goggles.

f. Disposable gloves.

g. Lab apron.

h. First aid kit.

i. Portable eye wash station.

j. Water supply for immediate flushing of spillage, if appropriate.

k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

4.0 PROCEDURE

4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.

4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.

4.3 Collect samples in the proper manner (refer to specific sampling SOPs).

4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.

4.5 Conduct QC sampling, as required.

4.6 Seal each container carefully and place in an individual "zip lock" bag.

4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.

4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.

4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure the sample containers and coolers are in compliance and properly labeled.

4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.

4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for measuring water levels using an electronic water level meter at the Ultra-Chem Site. A water level meter is an electronic sounding device that is typically used to measure the depth to groundwater in a monitoring well. These measurements are made from an established (surveyed) measuring point (MP). Measuring the depth to water (DTW) below the surveyed MP provides information for calculating groundwater elevations needed to construct groundwater elevation maps and determine the direction of groundwater flow.

2.0 DECONTAMINATION

The water level meter must be pre-cleaned (decontaminated) using a non-phosphate, laboratory-grade solution and rinsed with copious amounts of distilled or deionized water. This process is repeated before each measurement and following the final measurement.

3.0 CALIBRATION

There is no specific calibration procedure for a water level meter. If the water level meter is not working (i.e., does not detect water), the probe is to be returned to the supplier for repair; It is not to be repaired in the field. The probe's cord (typically a rubber-coated wire) provides a measurement scale to the nearest 0.01 foot.

4.0 PROCEDURE

4.1 Safety first. Obtain the appropriate work permit, Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

4.2 If the well is not vented, then remove the cap and wait several minutes for the water level to equilibrate. Take several measurements to ensure that the water level measured is in equilibrium with the aquifer (i.e., not changing substantially).

4.3 The manufacturer's model must be noted because some have switches, lights, beepers, or a combination of the above.

4.4 Check on a periodic basis that the cord has not kinked.

4.5 The water-level measurement is taken by lowering the probe into the well until the instrument-specific detection method (e.g., light, beeper, or both) is activated by contacting the water.

4.6 The electrical line is held at the MP and the DTW is determined by the measurement on the cord at the MP. All measurements will be recorded to the nearest 0.01 foot.

4.7 After measuring all wells in an area, always re-measure at least one well, preferably the first well measured, to see if the static water level has changed (e.g., due to pumping in the area, tidal effects, etc.). If a significant change has occurred, it may be necessary to re-measure other wells.

4.8 If there are previous water-level measurements available for the wells, then have these data available to compare the measurements with those just taken. Use these data to determine if water levels are similar or if they have changed. If water levels have changed, then check if the changes are consistent (i.e., all up or all down) and make sense.

4.9 Water-level elevations are calculated by subtracting the DTW from the MP, and correcting for the presence of separate-phase product if necessary. Water-elevation maps are then developed (contoured) on a well location map. This also provides a check to evaluate if the water levels make sense (or anomalies are evidenced). Re-measure the well(s) where anomalies are found as a check on the initial measurement(s).

4.10 If anomalies persist or water-level trends are different from the historical database, then check to see if hydrogeologic conditions and/or stresses have changed (e.g., discharge areas, pumping and/or injection wells, etc.).

4.11 All pertinent data will be documented in the field notebook, and initialed and dated.

END OF PROCEDURE

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sampling monitoring wells.

As part of the SOP for the sampling of groundwater monitoring wells, sample collection equipment and devices must be considered, and equipment decontamination and pre-sampling procedures (e.g., measuring water levels, and purging wells) must be implemented. The sampling objectives will be provided in specific investigation work plans that will be approved by the DTSC.

Unless otherwise specified in the DTSC-approved work plan, all groundwater purging and sampling will be performed using low stress (low flow) sample collection equipment in general accordance with the USEPA Region I Final Ground Water SOP for low stress (low flow) purging and sampling procedures for the collection of groundwater samples from monitoring wells, dated January 19, 2010. Low flow purging and sampling results in the collection of groundwater samples from monitoring wells that are representative of groundwater conditions in the geological formation by minimizing stress on the geological formation, and minimizing the disturbance of sediment in the bottom of the well. This procedure also minimizes aeration of the groundwater during sample collection, which improves the sample quality of the VOC analysis.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample groundwater from monitoring wells, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

a. Safety first. Obtain the appropriate work permit, Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

b. Adjustable rate, groundwater sampling pump (e.g., low-flow centrifugal submersible pump, bladder pump, peristaltic pump).

c. Teflon or Teflon-lined polyethylene tubing with ¼-inch or 3/8-inch inner diameter to collect samples for organic analysis. Teflon or Teflon-lined polyethylene tubing, PVC, Tygon or polyethylene tubing with ¼-inch or 3/8-inch inner diameter to collect samples for inorganic analysis. Sufficient tubing of the appropriate material must be available so that each well has dedicated tubing.

d. Appropriate power source (compressor or compressed gas tank, controller, generator, etc.).

e. Monitoring instrument for water quality indicator parameters (Horiba U-22 or equivalent) including temperature, dissolved oxygen, turbidity, specific conductance, pH and redox potential (Eh).

f. Flow measurement supplies (e.g., graduated cylinder and stop watch or in-line flow meter).

g. Electronic water level meter with a minimum of 0.01 foot accuracy.

h. Decontamination supplies including Non-phosphate laboratory-grade detergent, distilled/deionized water and potable water.

i. Roux Associates' low flow well sampling/purging data form and field notebook.

j. Well construction data logs, field data from previous sampling event, and site map with well locations.

k. Well security keys.

l. Plastic sheeting.

m. Paper towels, clean rags.

n. Teflon™ tape, electrical tape.

o. Calculator.

p. Black pen and water-proof marker.

q. Tools (e.g., wrenches, screwdrivers, hammer, pliers, flashlight, etc.) or alternatives recommended in the JSAs.

r. Disposable Nitrile gloves.

s. Laboratory-supplied sample containers with labels.

t. Cooler(s).

u. Ice (wet, blue packs).

v. Masking, duct, and packing tape.

w. Chain-of-custody form(s) and custody seal(s).

x. Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) or equivalent summary.

y. Site health and safety plan (HASP).

z. Packing material (e.g., bubble wrap)

aa. "Zip-lock" plastic bags.

bb. Overnight (express) mail forms (or schedule courier pickup if available).

3.0 DECONTAMINATION

3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the field equipment decontamination SOP; a summary of pump decontamination procedures is provided below). Use new, clean materials when decontamination is not appropriate (e.g., tubing, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form and in the field notebook.

A. Before sampling:

The manufacturer recommendations on pump disassembly for cleaning, if any, should take precedence to the disassembly recommendations presented below.

1) Wear disposable Nitrile and cut proof gloves.

2) Pre-rinse: Operate the pump first in an appropriate container with potable water for 5 minutes.

3) Wash: Operate the pump in an appropriate container with a non-phosphate, laboratory-grade detergent such as Alcanox and potable water solution for 5 minutes.

4) Rinse: Operate the pump in an appropriate container for 5 minutes with potable water.

5) Disassemble pump (refer to manufacturer's manual).

6) Wash pump parts: Place the disassembled parts of the pump into an appropriate container with non-phosphate detergent solution. Scrub the disassembled pump parts with an appropriate (e.g., test tube) brush.

7) Rinse pump parts with potable water.

8) Rinse the following parts with distilled/deionized water: inlet screen, shaft, suction interconnector, motor lead assembly, and stator housing.

9) Rinse impeller with potable water.

B. After each sample collection, decontaminate by:

1) Wear disposable Nitrile gloves.

2) Pre-rinse: Operating the pump first with potable water for 5 minutes.

3) Wash: Operate the pump in an appropriate container with a non-phosphate, laboratory-grade detergent such as Alcanox and potable water solution for 5 minutes.

4) Rinse: Operate the pump in an appropriate container for 5 minutes with potable water

5) Final Rinse: Operate the pump in an appropriate container to pump out 1 to 2 gallons of distilled/deionized water

6) Wipe pump-related equipment (e.g., electrical lines, cables) first with a clean cloth and detergent solution and then rinsing or wiping with a clean cloth and distilled/deionized water or potable water.

3.2 Note that the decontamination procedures for pumps are the minimum that must be performed. Check the work plan to determine if additional chemicals specified by individual state regulatory agencies also must be used for decontamination procedures (e.g., hexane, nitric acid, acetone, isopropanol, etc.).

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment before use (e.g., water quality meter, photoionization detector, flame ionization detector) according to the Manufacturer's calibration instructions. Document, initial and date the calibration procedures on the appropriate field form, and in the field notebook.

5.0 PROCEDURE

5.1 As practicable under field conditions, start at the well that is known or believed to have the least contaminated groundwater and proceed systematically to the well that is known or believed to have the most contaminated groundwater.

5.2 Document, initial and date well identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook as needed.

5.3 Inspect the protective casing of the well and the well casing, and note any items of concern such as a missing lock, or bent or damaged casing(s).

5.4 Place plastic sheeting around the well to protect sampling equipment from potential cross contamination.

5.5 Measure VOCs at the rim of the unopened well with a photoionization detector (PID) or flame ionization detector (FID) instrument and record the reading in the field notebook.

5.6 Remove the well cap or plug and, if necessary, clean the top of the well off with a clean rag. Place the cap or plug on the plastic sheeting. If the well is not vented, allow several minutes for the water level in the well to equilibrate. Never inhale the vapors.

5.7 Measure the depth to water (DTW) to 0.01 ft from the measuring point (MP) on the well (top of well casing) using an electronic water level meter. Calculate the water-level elevation. Document, initial and date the information on the appropriate field form and in the field notebook.

5.9 Decontaminate the water level meter with a non-phosphate, laboratory-grade detergent solution followed by a distilled/deionized water rinse.

5.10 Install Pump: Slowly lower the pump, safety cable, tubing and electrical lines into the well at midpoint of the immerged well screen or at the most permeable zone within the immerged well screen. The pump intake is to be kept at least two feet above the bottom of the well to prevent disturbance and re-suspension of any sediment or a sinking separate phase product (DNAPL) present in the bottom of the well.

If separate-phase product was identified in a measurable quantity, then the tubing should be installed using PVC with a tethered cap inserted into the well to bypass the LNAPL. The sample tubing should be inserted through the PVC, pushing out the cap at a depth below the LNAPL in order to sample the groundwater below the LNAPL.

5.11 Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the electronic interface probe in the well.

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

5.13 Record the physical appearance of the water (i.e., color, turbidity, odor, etc.) on the appropriate field form and in the field notebook, as it is purged. Note any changes that occur during purging.

5.14 Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, redox potential, and dissolved oxygen) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows:

±0.1 for pH
±3% for specific conductance and temperature
±10 mV for redox potential
±10% for DO and turbidity

And turbidity to be less than 50 NTU prior to sampling

The pump must not be removed from the well between purging and sampling.

ADDRESSING POTENTIAL PROBLEMS

Insufficient Yield

If the formation cannot produce enough water to sustain purging, then the well should be pumped to "near-dry" conditions (i.e., leaving some water in the well). Purging should be interrupted before the water level in the well drops below the top of the pump, as this may induce cascading of the sand pack. Pumping the well dry should be avoided to the extent possible in all cases. When preparing to conduct a sampling round, review drilling, well development and previous sampling information (if available) to identify low-yielding wells in order to purge them first, and potentially allow time for the well to recover for sampling.

Sampling should commence as soon as the volume in the well has recovered sufficiently to allow collection of samples. However, depending on the rate of recovery and the time needed to complete the sampling round, one of the following procedures may have to be implemented:

1) The well may have to be sampled over a period of more than one day.
2) The well may not yield enough water to collect a complete suite of samples and only select (most important) samples will be collected.
3) The well may not recover, which will preclude sampling.

Regardless of the option that must be followed, the sampling procedure must be fully documented in the field notebook.

Failure to Stabilize Key Indicator Parameters

If one or more key indicator parameters fail to stabilize after 4 hours or after 5 well volumes have been purged, one of four options should be considered:

1) Continue purging in an attempt to achieve stabilization.
2) Discontinue purging, do not collect samples, and document attempts to reach stabilization in the field notebook.
3) Discontinue purging, collect samples, and document attempts to reach stabilization in the field notebook.
4) Secure the well, purge and collect samples the next day (preferred)

The key indicator parameter for VOCs is dissolved oxygen.
The key indicator parameter for all other samples is turbidity.

Regardless of the option that is followed, the sampling procedure must be fully documented in the field notebook.

5.15 Collect Samples: Collect samples at a flow rate between 100 and 250 mL/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft.

VOC samples must be collected first. If a bladder pump is used, best practice would have it to match one compression stroke to the fill one VOC sampling vial.

Remove each appropriate container's cap only when ready to fill each with the water sample, and then replace and secure the cap immediately.

5.16 Fill each appropriate, pre-labeled sample container by allowing the ground water to flow from the tubing gently down the inside of the container to prevent: 1) agitating or creating turbulence; 2) breaking the container; 3) entry of, or contact with, any other medium; and 4) spilling/splashing the sample and exposing the sampling team to contaminated water. Immediately place the filled sample container in an ice-filled (wet ice or blue pack) cooler for storage. If wet ice is used it is recommended that it be repackaged in zip-lock bags to help keep the cooler dry and the sample labels secure. Check the work plan as to whether wet ice or blue packs are specified for cooling the samples because certain regulatory agencies may specify the use of one and not the other.

5.17 "Top-off" containers for VOCs and tightly seal with Teflon™-lined septums held in place by open-top screw caps to prevent volatilization. Ensure that there are no bubbles by turning the container upside down and tapping it gently.

5.18 Consult the work plan if filtered sampled should also be collected for dissolved metals analysis.

5.19 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance.

5.20 Note and record the "final" physical appearance of the water (after purging and sampling) on an appropriate field form and in the field notebook.

5.21 Remove pump and tubing.

5.22 Measure the total depth of the well from the MP with a water level meter. Document, initial and date the information on the appropriate field form and in the field notebook.

5.23 Wipe the well cap/j-plug with a clean rag, replace the well cap/j-plug and protective cover. Lock the protective cover in applicable.

5.24 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," placed in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory.

5.25 Decontaminate field equipment according to the decontamination of field equipment SOP. Wrap decontaminated equipment with a suitable material (e.g., clean plastic bag or aluminum foil). Discard rags, gloves, etc. in a manner consistent with site conditions.

5.26 Complete all necessary field forms, field notebook entries, and the chain-of-custody forms. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.

5.27 Samples will be delivered according to the QAPP schedule.

6.0 REFERENCES

U.S. Environmental Protection Agency – Region I. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. Revised January 19, 2010.

END OF PROCEDURE

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for measuring quality parameters of groundwater samples collected from groundwater monitoring wells at the Ultra-Chem Site. The parameters are measured in the field using a water quality meter (Horiba U-22 or equivalent). The water quality parameters include pH, temperature, conductivity, ORP, dissolved oxygen and turbidity. The manufacturer's instrument manual for each water quality meter, which is maintained with the instrument, will be referred to for calibration, use, repair, maintenance, or trouble-shooting operations.

The sampling objectives are provided in the work plan for conducting the investigative activities for the Ultra-Chem Site.

The pH will be measured in standard units (SU) and can be recorded with or without the SU designation. The conventional means of recording a pH value is without a unit designation (e.g., 7.0); however, the SU designation may be used provided the term is defined as standard units when first referenced. The pH is measured in the field to provide the pH of the water under ambient (in situ) conditions. The pH is a measure of the acidic (<7.0) or basic (>7.0) nature of the water and is used to assist in evaluating the mobility of contaminants. In addition, pH measurements can be used during well purging to help determine when sufficient groundwater has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer).

Conductivity will be measured and recorded in micromhos/centimeter (µmhos/cm). Some water quality meters measure directly in µmhos/cm while others have to be converted to this unit. The specific conductivity is measured in the field as a measure of the total dissolved solids (TDS) in the water samples. TDS data can then be used as a qualitative measure of contamination and to assist in evaluating electrical resistivity and borehole geophysical data. In addition, specific conductivity measurements can be used during well purging to help determine when sufficient groundwater has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer).

Temperature will be measured and recorded in degrees Celsius/Centigrade (° C). Temperature data is collected in the field to determine the temperature of the water sample under ambient (in-situ) conditions. Temperature data can be used to evaluate the mobility of compounds in groundwater and flow conditions. In addition, temperature measurements can be used during well purging to help determine when sufficient groundwater has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer).

ORP will be measured and recorded in millivolts (mV). ORP data is collected in the field for monitoring and controlling chemical addition of oxidizing or reducing agents. In addition, ORP data can be used during well purging to help determine when sufficient groundwater has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer).

Dissolved Oxygen (DO) will be measured and recorded in mg/L. DO data is collected in the field for monitoring the amount of oxygen dissolved in a unit volume of water. In addition, DO data can be used during well purging to help determine when sufficient groundwater has been purged (removed) from a well (i.e., the standing water in the well has been removed and replaced with "fresh" water from the aquifer).

Turbidity will be measured and recorded in Nephelometric Turbidity Units (NTU). Turbidity data is collected to measure the presence of suspended particulates in water.

2.0 CALIBRATION

Prior to calibration, all water quality meters must be cleaned and the battery checked according to the manufacturer's instructions. Document, initial and date the pre-calibration procedure on the appropriate field form, and in the field notebook.

2.1 Safety first. Obtain the appropriate work permit, Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

2.2 Calibration of the water quality meter(s) is to be performed at the beginning of each day's use in accordance with the manufacturer's specific calibration instructions. At the end of each day, a calibration check is performed to verify that the instrument(s) remained in calibration throughout the day. This check is to be performed while the instrument(s) is in measurement mode, not calibration mode. Usual procedures are given below.

2.3 Recalibration must occur if: 1) the parameter being measured is outside the previous calibration range (if meter readings are zero or a negative number for DO, pH, conductivity or turbidity [negative value only]); 2) the procedure or use conditions warrant frequent calibrations.

2.4 The volume of the calibration solutions must be sufficient to cover both the probe and temperature sensor (see manufacturer's instructions for the volume to be used). Note that most instrument manuals state there is no calibration for the temperature sensor, but the temperature sensor must be checked to determine its accuracy. If the accuracy check date/information is not included with the instrument or the last check was over a year, the temperature sensor accuracy needs to be checked at the beginning of the water quality measuring event.

2.5 A minimum of two standards should be used to bracket the instruments measurement range for all parameters except ORP (refer to manufacturer's instructions).

2.6 The following information is documented in the calibration logbook and /or field notebook at the time of calibration:

a. Date.
b. Water Quality meter identification.
c. Pre-cleaning and battery check.

d. Calibration results.
e. Initials of the individual performing calibration.

3.0 PROCEDURE

3.1 A warm-up period may or may not be necessary for the instrument, depending on instrument requirements. The manufacturer's instrument manual must be followed.

3.2 See Ultra-Chem SOP-3 for information regarding low flow well sampling/purging procedures.

3.3 The groundwater quality parameters will be continuously measured by the water quality meter coupled with a flow-through-cell. If the accumulation of sediment buildup in the cell is observed, continue pumping and disconnect the cell for cleaning, then reconnect after cleaning and continue monitoring activities. If air bubbles accumulation is observed in the cell, place the meter at a 45 degree angle with the port facing upward to help evacuate any air bubble buildup.

3.5 Pertinent data are documented in the field notebook or appropriate field form, initialed and dated.

3.6 The electrodes are rinsed with distilled or deionized water and the unit stored properly in accordance with the manufacturer's instructions (e.g., capping and storing in a buffer such as altex electrode storage solution). The electrodes are not to be stored in potable water, or distilled or deionized water.

END OF PROCEDURE

APPENDIX G

Site Management Forms

ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY D.P.C.

SITE-WIDE MONITORING, INSPECTION, AND MAINTENANCE FORM

Client: **SB Gerard Avenue LLC**
Location: **586 Gerard Avenue, Bronx, New York**
BCP Site # **C203142**
Inspector: _____
Date: _____

Site Observations:

Yes	No	
[ ]	[ ]	Have any site improvements been made since the last inspection?
[ ]	[ ]	Has there been any maintenance activity impacting the institutional and/or engineering controls? -Include sketches or photos of observations

Inspection of Building Covers and Asphalt/Concrete Caps (If Applicable):

Yes	No	
[ ]	[ ]	Were all buildings inspected?
[ ]	[ ]	Were significant cracks observed?
[ ]	[ ]	Was any other damage observed? If yes, refer to Page 3 for additional clarification.
[ ]	[ ]	Were any new slab penetrations observed? If yes, include description on Page 3. -Include sketches or photos of observations

Inspection of Groundwater Usage:

Yes	No	
[ ]	[ ]	Is groundwater underlying the property being used for any purposes including, but not limited to, drinking water or industrial purposes?

Include additional information and details on Page 3 of this inspection form if the response to any of the above questions warrants additional explanation.

ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY D.P.C.

SITE-WIDE MONITORING, INSPECTION, AND MAINTENANCE FORM

Client: **SB Gerard Avenue LLC**

Location: **586 Gerard Avenue, Bronx, New York**

BCP Site # **C203142**

Inspector: _____

Date: _____

Inspection of Remaining Contaminated Material:

Yes	No	
[ ]	[ ]	Have there been any activities that caused a disturbance of remaining contaminated material since the last inspection?
[ ]	[ ]	If yes, were the activities conducted in accordance with the Site Management Plan (SMP)? -Include sketches or photos of observations

Inspection of Gardens and Farming:

Yes	No	
[ ]	[ ]	Is there any evidence of vegetable gardens and/or farming at the property (aside from raised planters)? -Include sketched or photos of observations.

Site Records:

Yes	No	
[ ]	[ ]	Are site records up to date (e.g., Site Management Plan, Site Inspection Checklists)?

Inspection of Property Usage:

Yes	No	
[ ]	[ ]	Is the property being used for any purposed other than restricted residential, commercial, and/or industrial use?

Include additional information and details on Page 3 of this inspection form if the response to any of the above questions warrants additional explanation.

ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY, D.P.C.

SITE-WIDE MONITORING, INSPECTION, AND MAINTENANCE FORM

Client: **SB Gerard Avenue LLC**

Location: **586 Gerard Avenue, Bronx, New York**

BCP Site # **C203142**

Inspector:

Date:

Site Observations

Additional Comments or Clarification Where Corrective Actions May Be Required:

Well Sampling Data Form

Client: _____ **Project Number:** _____

Site Location: _____

Well No: _____ Weather: _____

Date: _____ Purge Water Disposal: _____

Sampled By: _____ Well Diameter / Type: _____

Depth of Well (ft): _____ Water Column (ft): _____

Depth to Water(ft): _____ Volume of Water in Well (gal) _____

Depth to Product (ft): _____ Volume of Water to Remove (gal): _____

well diameter:	1 in	2 in	4 in	6 in	8 in
gallons per foot:	0.041	0.163	0.653	1.469	2.611

Start Purging: _____ Purge Rate: _____

End Purging: _____ Volume of Water Removed (gal): _____

Method of Purge: _____ Method of Sampling: _____

Physical Appearance/ Comments: _____

Samples Collected: (analyses / no. bottles) _____

Time: _____ Laboratory : _____

Field Measurements:

Time	DTW ft	Flow Rate ml/min	ORP mV (+/- 10 mV)	Conductivity mS/m - S/m (w/in 3%)	Turbidity NTU (w/in %10)	pH SU (+/- 0.1)	Temperature C^o - F^o (w/in 3%)	Dissolved O_2 mg/L (w/in 10%)

ROUX

APPENDIX H

Remedial Party/Owner Responsibilities

APPENDIX H - RESPONSIBILITIES of OWNER and REMEDIAL PARTY RESPONSIBILITIES

The responsibilities for implementing the Site Management Plan ("SMP") for the 580 Gerard Former Post Office Vehicle Repair Site located at 586 Gerard Avenue, Bronx, New York (the "Site"), Site No. C203142, are defined below. The owner is currently listed as:

- Legal Owner – SB GERARD AVENUE LLC

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

- SB GERARD AVENUE LLC, 586 Gerard Avenue, Bronx, New York, att. Mr. Sharone Karten

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.
2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a(n) Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.
3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.
4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. In the event that damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.2: Notifications.
6) In the event some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.2: Notifications and (ii) coordinate the performance of necessary corrective actions with the RP.
7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership.

Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 2.1 of the SMP. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) The owner will maintain fences, conduct mowing, etc. on behalf of the RP. The RP remains ultimately responsible for maintaining the engineering controls.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the maintenance and reporting with respect to any Engineering Control. The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .
6) The RP shall notify the NYSDEC of any damage to or modification of the Engineering Control as required under Section 2.1: Notifications of the SMP.
7) Prior to a change in use that impacts the Engineering Control or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.
8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the Department to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

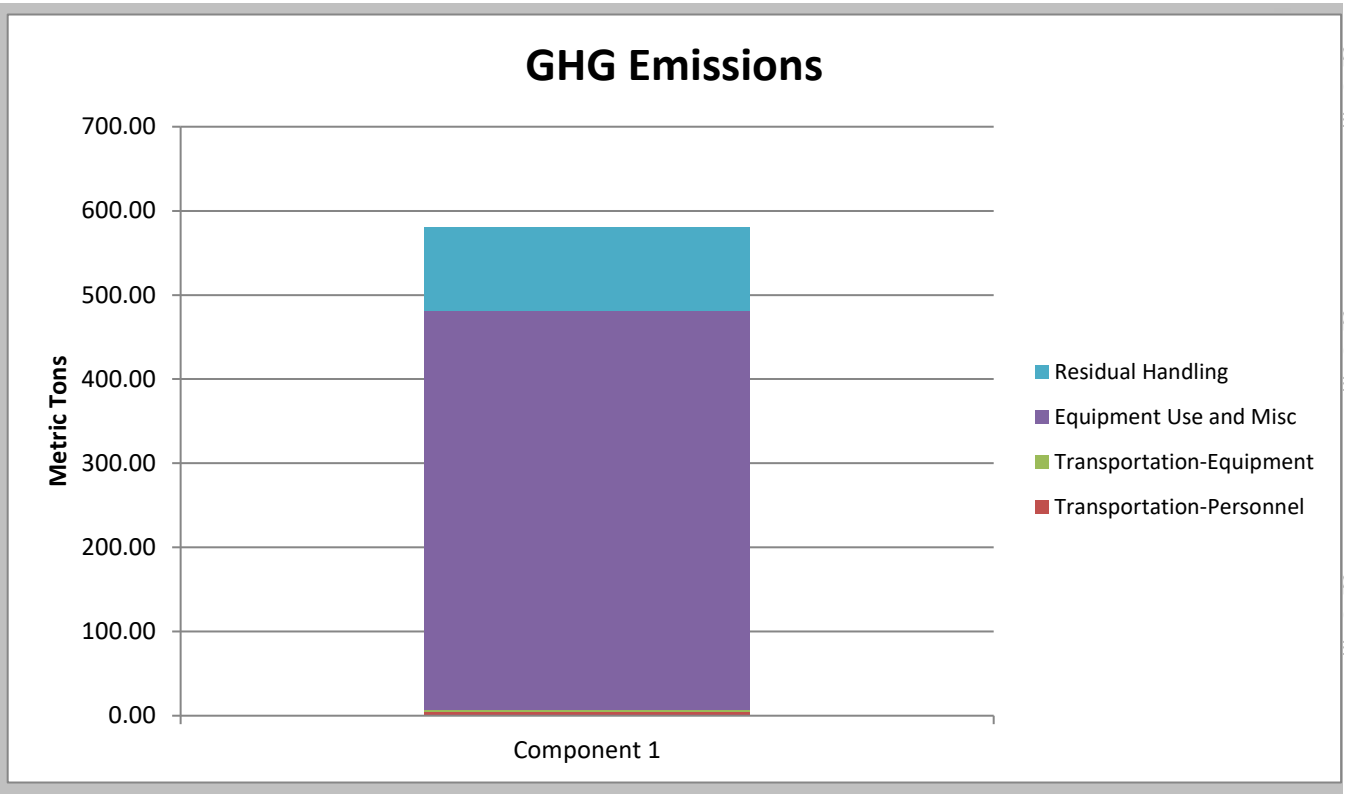
APPENDIX I

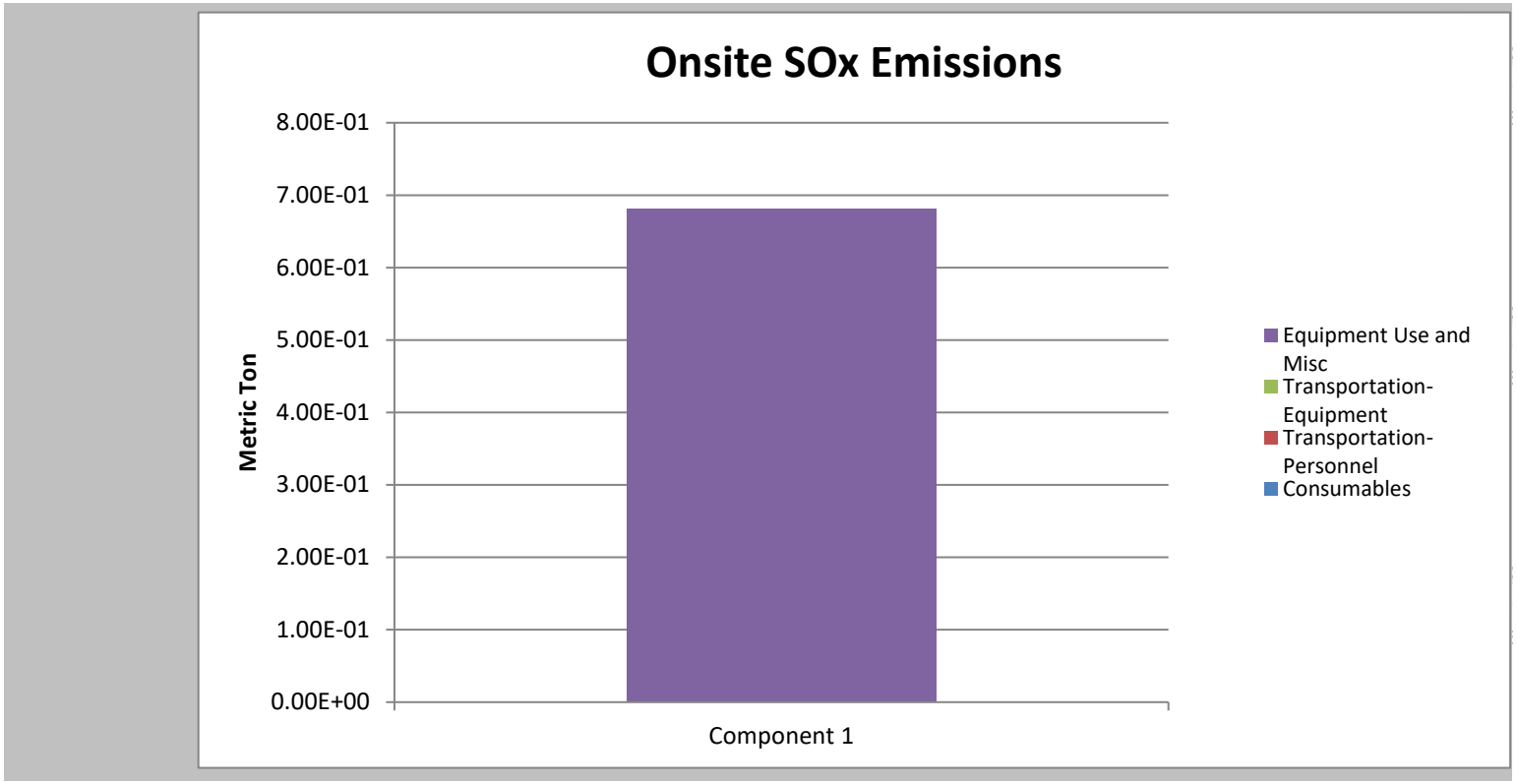
SiteWise Analysis

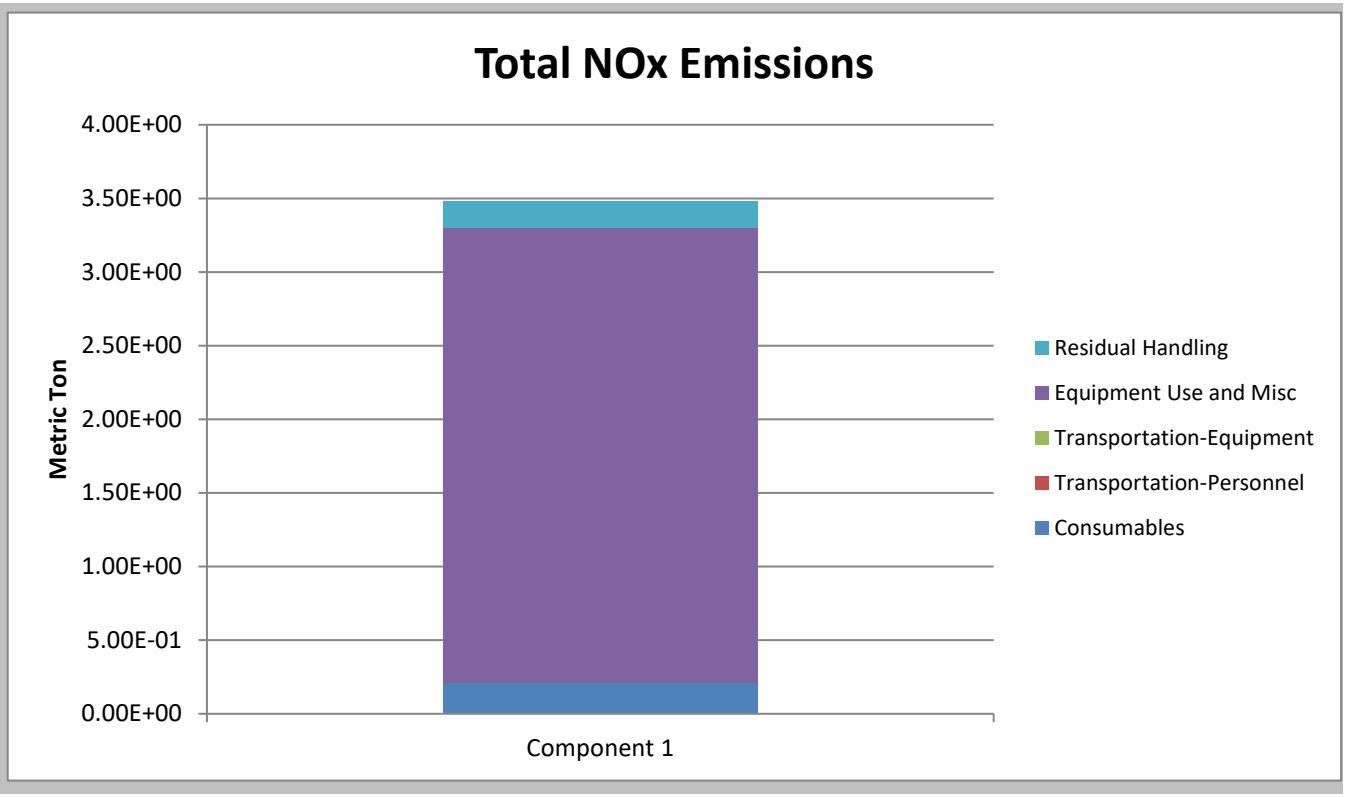
Sustainable Remediation - Environmental Footprint Summary
BCP C203142

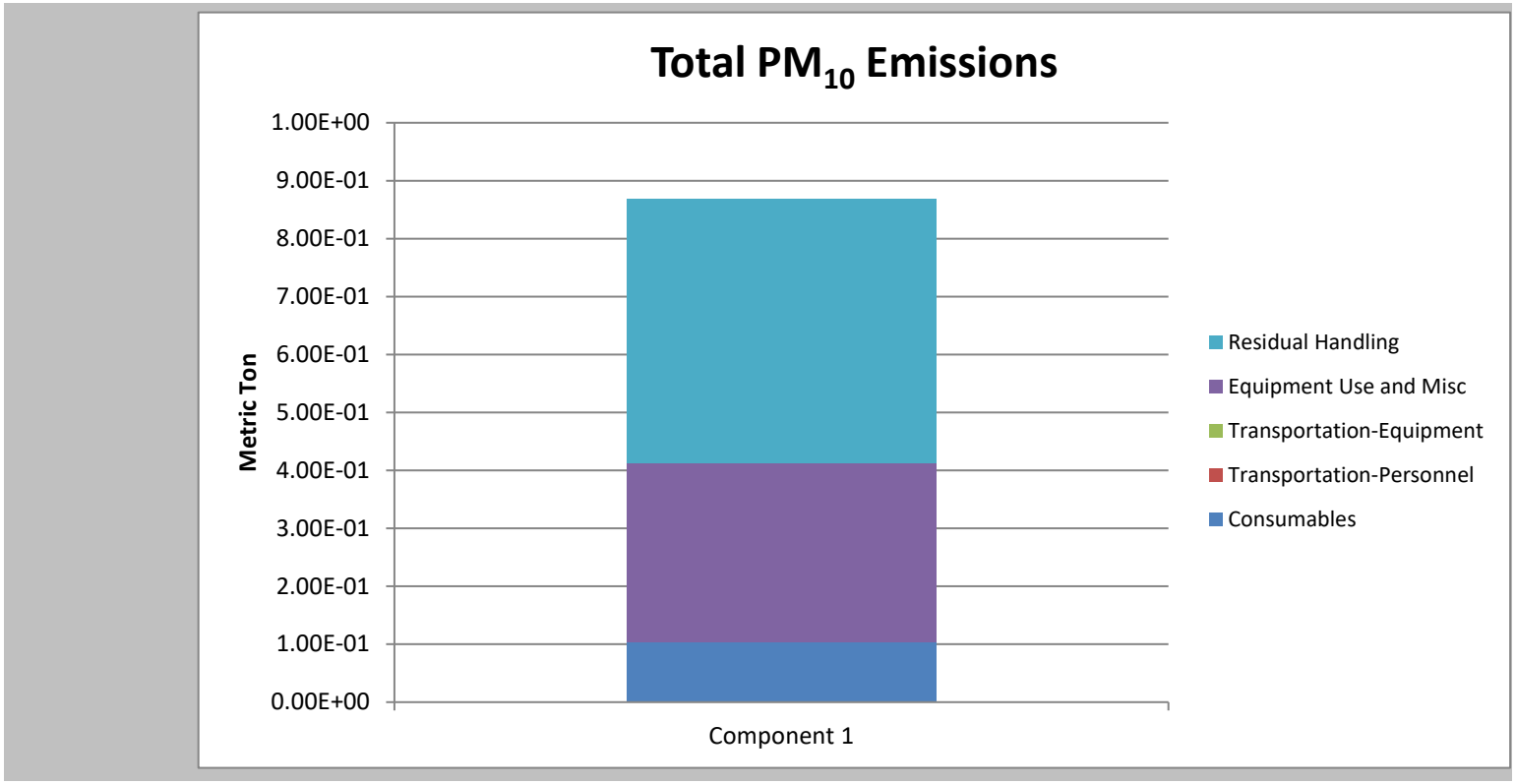
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage
		metric ton	MMBTU	gallons	MWH
Component 1	Consumables	54.55	1.6E+03	NA	NA
	Transportation-Personnel	4.50	5.7E+01	NA	NA
	Transportation-Equipment	2.73	3.6E+01	NA	NA
	Equipment Use and Misc	473.69	8.5E+03	0.0E+00	0.0E+00
	Residual Handling	99.68	1.5E+03	NA	NA
	Sub-Total	635.16	1.17E+04	0.00E+00	0.00E+00
Total		**6.4E+02**	**1.2E+04**	**0.0E+00**	**0.0E+00**

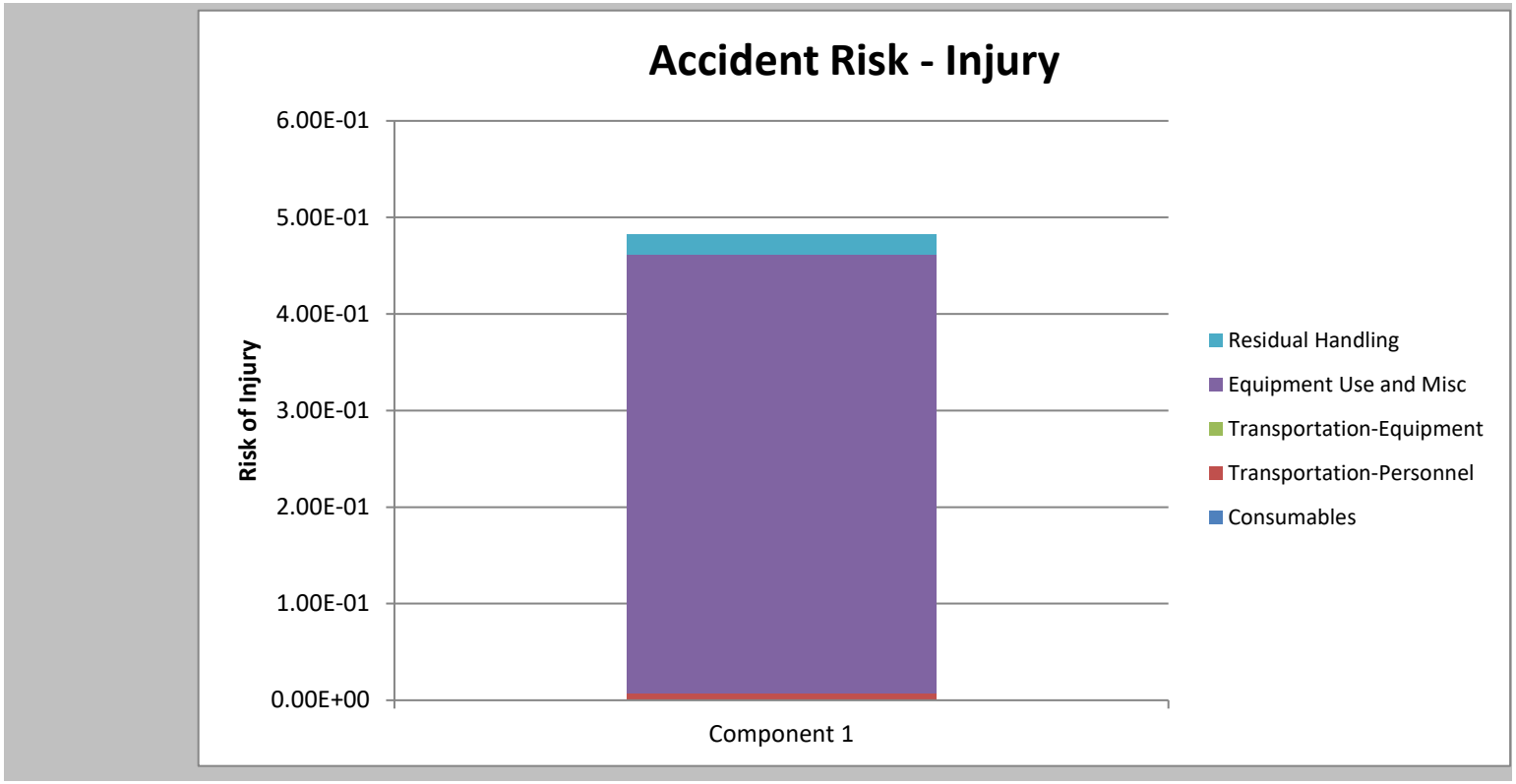
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing
	tons	tons	cubic yards	$
Component 1	2.5E+03	0.0E+00	0.0E+00	0
Total	**2.5E+03**	**0.0E+00**	**0.0E+00**	**$0**

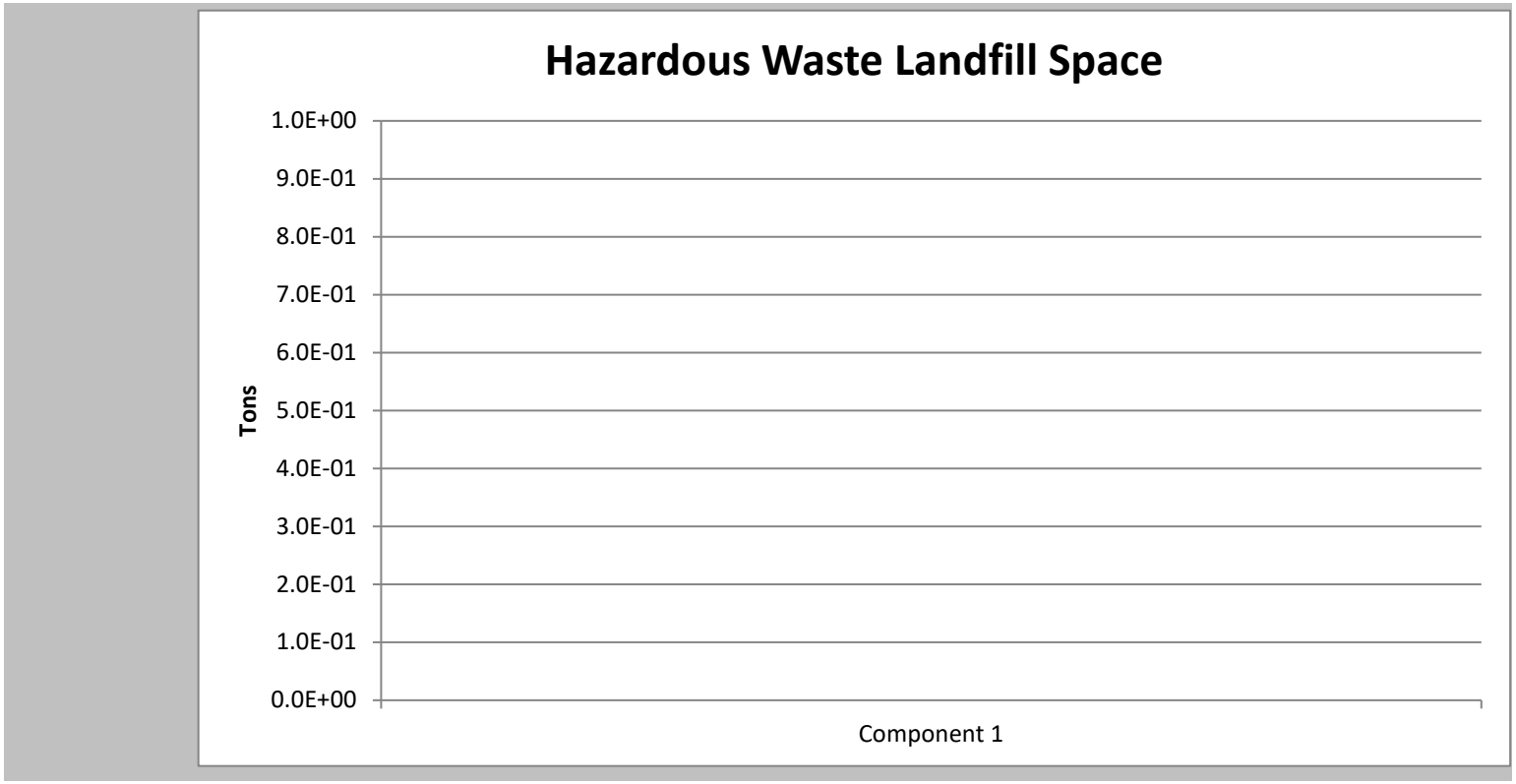

GHG Emissions
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Metric Tons
Component 1
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel

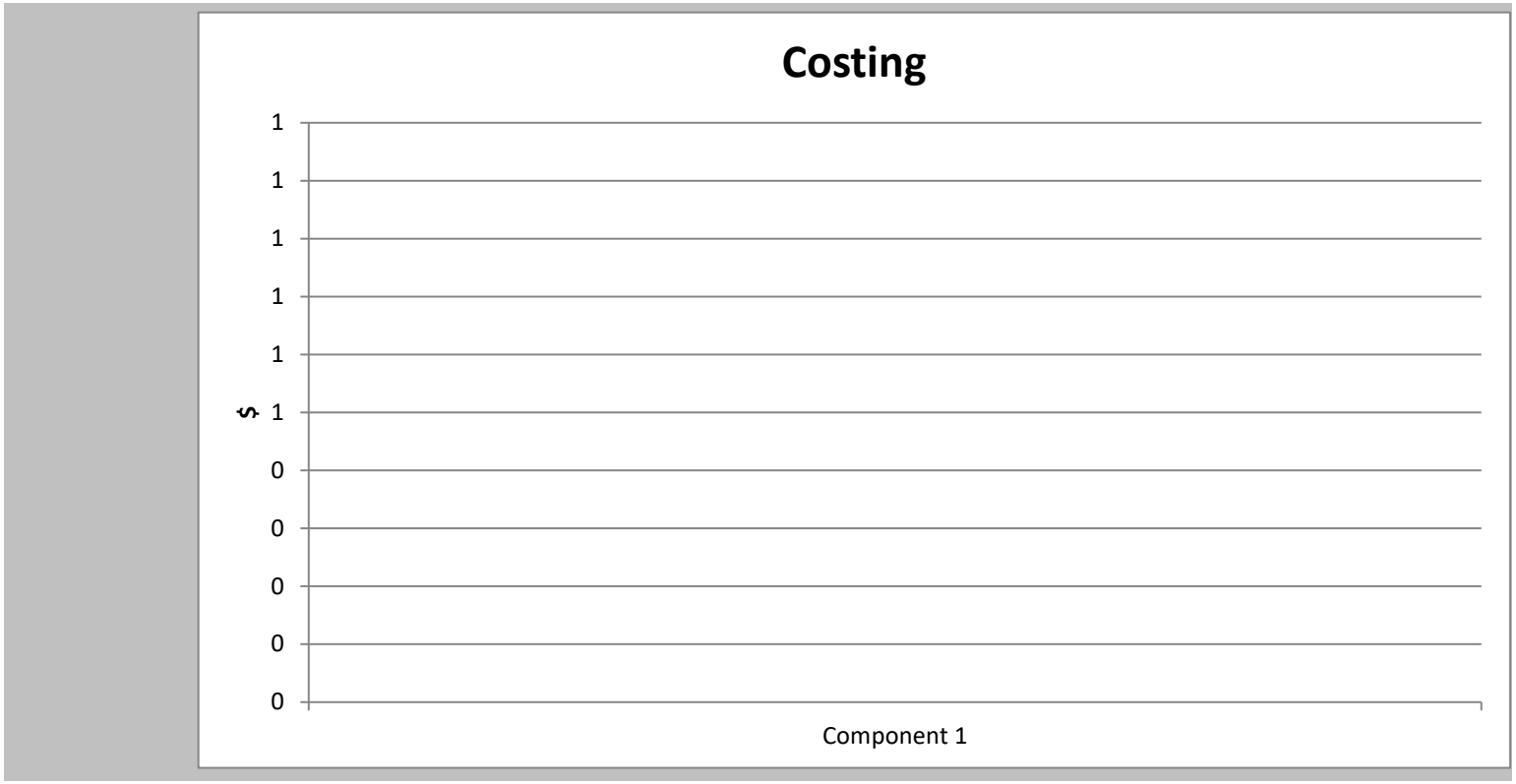

Onsite SOx Emissions
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Metric Ton
Component 1
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Total NOx Emissions
4.00E+00
3.50E+00
3.00E+00
2.50E+00
2.00E+00
1.50E+00
1.00E+00
5.00E-01
0.00E+00
Metric Ton
Component 1
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Total PM10 Emissions
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Metric Ton
Component 1
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Accident Risk - Injury
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Risk of Injury
Component 1
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Hazardous Waste Landfill Space
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Tons
Component 1


Costing
1
1
1
1
1
$ 1
0
0
0
0
0
Component 1