



*Known for excellence.  
Built on trust.*



**Remedial Investigation Work Plan  
19-27 Clay Street & 60-62 Commercial Street  
Brooklyn, New York  
NYSDEC BCP No. C224390**

June 2024  
File No. 41.0163279.00

**PREPARED FOR**  
**NYSDEC – Division of Environmental Remediation**  
625 Broadway | Albany, NY 12233

**PREPARED BY:**  
**GZA GeoEnvironmental of New York**  
104 West 29<sup>th</sup> Street, 10<sup>th</sup> Floor | New York, NY 10001

32 Offices Nationwide  
[www.gza.com](http://www.gza.com)

Copyright© 2024 GZA GeoEnvironmental of New York



Known for excellence.  
Built on trust.

GEOTECHNICAL  
ENVIRONMENTAL  
ECOLOGICAL  
WATER  
CONSTRUCTION  
MANAGEMENT

104 West 29th Street  
10th Floor  
New York, NY 10001  
T: 212.594.8140  
F: 212.279.8180  
www.gza.com



June 24, 2024  
File No. 41.0163279.00

Ms. Jennifer Gonzalez  
New York State Department of Environmental Conservation  
Division of Environmental Remediation  
625 Broadway  
Albany NY, 12233

Re: Remedial Investigation Work Plan Report  
19-27 Clay Street  
Brooklyn, New York  
NYSDEC BCP No. C224390

Dear Ms. Gonzalez:

GZA GeoEnvironmental of New York (GZA) is pleased to provide the Revised Remedial Investigation Work Plan (RIWP) for the above-referenced property (Site). The RIWP was revised to address the comments received from the NYSDEC and NYSDOH on June 7, 2024.

Should you have any questions, please contact Victoria Whelan at (631) 793-8821 or [Victoria.Whelan@gza.com](mailto:Victoria.Whelan@gza.com) or Mark Hutson at (646) 929-8955 or [Mark.Hutson@gza.com](mailto:Mark.Hutson@gza.com).

Very truly yours,

**GZA GEOENVIRONMENTAL OF NEW YORK**

Mark Hutson, P.G.  
Senior Project Manager

Stephen M. Kline, P.E.  
Consultant Reviewer

Victoria Whelan, P.G.  
Associate Principal

Enclosure: Remedial Investigation Work Plan



**TABLE OF CONTENTS**

**CERTIFICATION**

**1.0 INTRODUCTION ..... 1**

**2.0 PHYSICAL SITE CHARACTERISTICS..... 1**

2.1 SITE DESCRIPTION ..... 1

2.2 SITE HISTORY..... 2

2.3 AREAS OF CONCERN ..... 5

2.4 SURROUNDING LAND USE ..... 6

2.5 HYDROGEOLOGIC SETTING ..... 6

2.6 PROPOSED REDEVELOPMENT/PROJECT DESCRIPTION ..... 6

**3.0 REMEDIAL INVESTIGATION ..... 6**

3.1 OBJECTIVES ..... 6

3.2 UTILITY CLEARANCE ..... 7

3.3 GROUNDWATER MONITORING WELLS..... 7

3.4 SOIL SAMPLING ..... 10

3.5 SOIL VAPOR POINT INSTALLATION AND SAMPLING ..... 11

3.6 DISPOSAL..... 13

3.7 EQUIPMENT DECONTAMINATION ..... 13

3.8 SAMPLING QA/QC PROTOCOL ..... 14

3.9 AIR MONITORING..... 14

3.10 HEALTHY & SAFETY ..... 15

3.11 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT ..... 15

3.12 FISH AND WILDLIFE RESOURCE IMPACT ANALYSIS..... 15

3.13 GREEN AND SUTAINABLE REMEDIATION (GSR) PRACTICES ..... 15

**4.0 REPORTING..... 16**



4.1 REMEDIAL INVESTIGATION REPORTING ..... 16

4.2 DAILY REPORTS ..... 16

4.3 MONTHLY REPORTS ..... 17

**5.0 COMMUNITY RELATIONS ..... 17**

**6.0 SCHEDULE..... 18**

**TABLES**

TABLE 1 SUMMARY OF PROPOSED SAMPLING

**FIGURES**

FIGURE 1 TOPOGRAPHIC MAP

FIGURE 2 SITE LOCATION MAP

FIGURE 3 MAP OF SOIL SAMPLING RESULTS

FIGURE 4 MAP OF GROUNDWATER SAMPLE RESULTS

FIGURE 5 MAP OF SOIL VAPOR DETECTIONS

FIGURE 6 PROPOSED SAMPLING LOCATIONS





**APPENDICES**

|            |                                                    |
|------------|----------------------------------------------------|
| APPENDIX A | QUALITY ASSURANCE PROJECT PLAN (QAPP)              |
| APPENDIX B | HEALTH AND SAFETY PLAN (HASP)                      |
| APPENDIX C | COMMUNITY AIR MONITORING PLAN (CAMP)               |
| APPENDIX D | HISTORICAL DATA TABLES (MARCH 2023 AND MAY 2023)   |
| APPENDIX E | GREEN AND SUSTAINABILITY REMEDIATION DOCUMENTATION |



#### CERTIFICATION

I, Victoria D. Whelan, certify that I am currently a Qualified Environmental Professional as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and that this Remedial Investigation Work Plan (RIWP) was prepared in accordance with all applicable statutes and regulations and substantial conformance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation.

A handwritten signature in black ink, appearing to read 'Victoria D. Whelan'.

---

Victoria D. Whelan, QEP, NYSPG



## 1.0 INTRODUCTION

The following Remedial Investigation Work Plan (RIWP) was prepared by GZA GeoEnvironmental Of New York (GZA) on behalf of Clay Properties, LLC, the Brownfield Cleanup Program (BCP) volunteer, relative to the necessary remediation of the real property located at 19-27 Clay Street and 60-62 Commercial Street, Brooklyn, New York, BCP Site No. C224390 (herein referred to as the 'Site' or 'Property'). This RIWP is based upon the guidelines set forth in Section 3 of the New York State Department of Environmental Conservation (NYSDEC) Draft Brownfield Cleanup Program Guide dated May 2004 and NYSDEC's DER-10 Technical Guidance for Site Investigations and Remediations. The proposed scope of work discussed in this RIWP will be conducted in accordance with the Quality Assurance Project Plan (Appendix A), the Health & Safety Plan (Appendix B) and the Community Air Monitoring Plan (Appendix C).

The Site is currently enrolled in the NYSDEC BCP as BCP Site No. C224390. Prior investigations indicate that the subsurface, including the soil, groundwater and soil vapor have been impacted by past usage of the Site. Based on the previous investigations for the purposes of developing this RIWP and the HASP, the contaminants of concern are Volatile Organic Compounds (VOCs). One previous study was completed:

1. Remedial Investigation Report (RIR), Clay Properties, Preferred Environmental March 2023.

The results of the March 2023 RIR will be included in the RIR for this scope of work. It should be noted that additional samples were collected on Tax Lot 9 in May of 2023 to confirm the impacts across the Site. Those results will not be included as part of the RIR; samples will be collected under full QA/QC protocols as described in this RIWP in those locations.

The information collected from the previous investigations document that there is contamination of VOCs, at the Site. Due to the limited nature of the previous investigations GZA has prepared this RIWP to fully identify the nature and extent of the impacted media beneath the Site.

The purpose of this RIWP is to outline the scope and protocol to be followed during the investigation of soil, groundwater, and soil vapor to:

1. Define the nature and extent of all contamination;
2. Identify contaminant source areas; and
3. Produce data of sufficient quantity and quality to support the development of a NYSDEC acceptable Remedial Action Work Plan.

## 2.0 PHYSICAL SITE CHARACTERISTICS

### 2.1 SITE DESCRIPTION

The site is located at 19-27 Clay Street and 60-62 Commercial Street, Brooklyn, NY 11222. The site is comprised of two New York City Tax Lots (County: Brooklyn; Block 2482; Lots 9 and 10 (formerly Lot 9)). The total area of the site is 10,260 square feet (sq ft); Lot 9 is 6,552 sq ft, Lot 10 is 3,708 sq ft. The Site has frontage on both Clay Street and Commercial Street. The site is partially developed.



The site can be best described as two separate areas. There is 1) a two-story unoccupied warehouse located at 19 Clay Street and 2) a yard area located at 60-62 Commercial Street. The site is gated to avoid any trespassers entering the premises. The yard area does have storage trailers located within the gate.

The Site is currently unoccupied. Tax Lot 10 (60-62 Commercial Street) does have shipping containers being utilized for storage. The use of the site will not interfere with the investigation or when the remediation commences. An Interim Remedial Measure Work Plan (IRM WP) will be submitted with this report and the BCP Application for Lot 9 that will be conducted in concert with this RIWP.

The site is currently inactive, and the current zoning designation is M1-2-R6. The Site is level and has no natural or artificial surface water bodies or impoundments. The depth to groundwater is between 6-8 feet below surface grade. A Topographic Map and a Property Location Map are included as Figures 1 and 2, respectively.

## 2.2 SITE HISTORY

The site was utilized for various industrial and manufacturing operations including iron works, tin can storage facility, cotton batting company, paper storage warehouse, and “non-specific manufacturing use.” Interflo Technologies operated at 19-27 Clay Street as a Resource Conservation and Recovery Act (RCRA) small quantity hazardous waste generator from at least July 1994 to January 1997. Interflo Technologies generated ignitable, halogenated, non-halogenated solvents and mercury waste under USEPA ID No. NY0000374314. Multiple RCRA violations were identified for the Site; however, all were addressed to the satisfaction of USEPA.

### Sanborn History:

**1887-1905:** The site is developed with multiple structures identified as the Logan Iron Works, including a blacksmith shop, a flange shop and a boiler shop. Commercial Street and additional portions of the iron works are to the north, followed by a sugar refinery.

**1916:** The site is developed consistent with the 1905 map depictions; however, the buildings are now identified as a tin can storage facility.

**1942-1951:** The site has been redeveloped with two commercial/industrial buildings along Clay Street. These include a 2-story structure (west) occupied by a cotton batting manufacturer and a 1- and partial 2- story structure (east) identified as a paper storage warehouse. Northern portions of the property are undeveloped. These structures are consistent with the existing buildings.

**1965:** Both buildings are identified as occupied by non-specific manufacturing uses. The northern portion of the property is identified as a lumber storage yard.

### Previous Investigations:

The following investigations were previously performed at the Site:

1. Remedial Investigation by Preferred Environmental Services, March 2023
2. Supplementary Remedial Investigation by Preferred Environmental Services, May 2023



### **Remedial Investigation (RI) by Preferred Environmental Services (Preferred), March 2023**

Preferred conducted an RIR under the oversight of the New York City Office of Environmental Remediation (NYCOER). The RI was completed for three NYC Tax Lots (9, 10 and 53) identified at 19-27 Clay Street, 53 Clay Street and 60-62 Commercial Street. The investigation included the installation of ten (10) soil borings, five (5) permanent groundwater monitoring wells, nine (9) soil vapor probes. Of the samples collected for the RI, this section summarizes the samples collected specifically associated with the BCP Site. At the time of the RI 19—27 Clay Street was not accessible and therefore no samples were collected. At 60-62 Commercial Street, a total of six (6) soil samples, two (2) groundwater samples, and three (3) soil vapor samples were collected and sent for a laboratory analysis. This subsurface investigation did not include the 19-27 Clay Street portion of the project as it was undergoing renovation but included 60-62 Commercial Street portion of the property.

Soil samples were analyzed for the following:

- Target Compound List (TCL) volatile organic compounds (VOCs) by United States Environmental Protection Agency (EPA) Method 8260
- TCL semi-volatile organic compounds (SVOC) by EPA Method 8270
- Target Analyte List (TAL) metals by EPA Method 6000/7000 series
- Pesticides/polychlorinated biphenyls (PCB) by EPA Method 8081/8082
- 1,4-Dioxane and Poly-Fluoro-Aalkyl Substances (PFAS)

Groundwater samples were analyzed for the following:

- TCL VOCs by United States EPA Method 8260
- TCL SVOCs by EPA Method 8270
- TAL metals EPA Method 6000/7000 series (filtered and unfiltered)
- Pesticides/polychlorinated biphenyls (PCB) by EPA Method 8081/8082

Soil vapor samples were analyzed for the following:

- TCL VOCs analysis via EPA Method TO-15

### **Supplemental Remedial Investigation by Preferred Environmental Services, May 2023**

Preferred conducted a Supplemental Remedial Investigation of 19-27 Clay Street in May 2023. A total of five (5) soil borings, three (3) permanent groundwater monitoring wells, two (2) soil vapor probes were installed to evaluate soil, groundwater, and soil vapor quality at the Site. A total of eight (8) soil samples, three (3) groundwater samples, two (2) soil vapor samples were collected and sent for a laboratory analysis.

Soil samples were analyzed for the following:



- Target Compound List (TCL) VOCs by EPA Method 8260

Groundwater samples were analyzed for the following:

- TCL VOCs by United States EPA Method 8260

Soil vapor samples were analyzed for the following:

- TCL VOCs analysis via EPA Method TO-15

#### **Summary of Historical Environmental Findings:**

1. Depth to groundwater is shallow and between 6-8 feet below ground surface grade.
2. On-site groundwater flow is generally northwest.
3. Bedrock was not encountered during the investigation.
4. Soils encountered throughout the site consisted generally of brown fine grained sandy fill mixed with wood, gravel and/or brick fragments (consistent with historic fill material) from grade surface to a depth of approximately 4 feet (ft) below ground surface (bgs), Soil below 4 feet did have silty clay to the terminal drilling depth (10-15 ft bgs).
5. The known contaminants of concern include the following in the soil:

#### **VOCs**

Trichloroethylene (TCE) was reported above both the Protection of Groundwater Soil Cleanup Objective (PGSCO) and Unrestricted Use Soil Cleanup Objective (UUSCO) in SB-11 (1-3 ft) at 0.740 mg/kg over the standard of 0.47 mg/kg.

#### **SVOCs**

Dibenzo (a,h)anthracene (maximum 3.270 mg/kg) was above the applicable RRSCO. Additionally, SB-8 (0-2 ft) also reported Phenol (maximum 0.459 mg/kg) at a concentration above the Protection of Groundwater SCO. The elevated detections of SVOCs were not present in the deeper samples within the same borings.

#### **Total Metals**

Four metals, Arsenic (maximum 23.2 mg/kg in SB-9 (0-2')), Copper (maximum 365 mg/kg in SB-8 (0-2')), Lead (maximum 1,180 mg/kg in SB-8 (0-2')) and Mercury (maximum 4.280 mg/kg in SB-10 (0-2')) were detected at or above their applicable Restricted Residential Use Soil Cleanup Objective (RRSCO) and/or the Protection of Groundwater SCO. The elevated detections of inorganic constituents were not detected at the deeper sample locations within the same boring.



6. Two VOCs were detected in groundwater samples collected across the site at concentrations exceeding NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGVs). Trichloroethane was detected above the AWQSGVs in each sample with a maximum of 142 ug/L (AWQSGVs - 5 ug/L) and cis--1,2-dichloroethylene at 10.4 ug/L(AWQSGVs - 5 ug/L).
7. Five (5) soil vapor samples were collected and analyzed across the site. All of the soil vapor samples had elevated detections of chlorinated solvents as are summarized below by contaminant:
  - 1,1,1-Trichloroethane – Samples had detections ranging from 42ug/m3 to 300 ug/m3 on the Clay Street side. Soil Vapor samples collected from the Commercial Street side of the site did not have detections over the reporting limit.
  - Carbon Tetrachloride - The soil vapor sample SV-10, installed on the Clay Street side of the site reported the maximum detection of 72 ug/m3. The other samples did have detections ranging from 46 ug/m3 (Clay Street side) to 27 ug/m3 (Commercial Street side). cis-1,2-dichloroethene. The soil vapor sample, SV-10 installed on the Clay Street side of the site reported the maximum detection of 140 ug/m3.
  - Tetrachloroethylene (PCE) - PCE was detected in soil vapor samples collected across the property at concentrations ranging from 220 ug/m3 to 1,600 ug/m3.
  - Trichloroethene (TCE) - TCE was detected in soil vapor samples collected from across the site at concentrations ranging from 60 ug/m3 to 180,00 ug/m3.

### 2.3 AREAS OF CONCERN

Based on the site history and the findings of the previous studies, the Areas of Concern (AOCs) to be further investigated during the RI are as described below:

#### **AOC-1 Historical Site Use**

Information obtained from multiple historic sources revealed that the site was utilized as for various industrial/manufacturing operations from at least 1887. In addition, the site was identified on several regulatory agency databases related to hazardous waste generation with multiple RCRA and other agency violations. Given the length of time this facility operated, the lack of information regarding its operations and chemical/waste handling practices, there is a potential for historic operations to have impacted the subsurface.

Historic information also revealed that a number of the adjacent/surrounding properties were also historically utilized for various industrial/manufacturing uses, machine shops, iron works/foundries, service stations, garages/repair shops, and railroad/bus maintenance facilities. Further the southern and eastern adjacent properties are listed on multiple regulatory agency databases, including the NY SHWS and NY Brownfields, with documented impacts to the subsurface. As such, there is a potential for historic operations at these properties to have impacted the subsurface (soil vapor and/or groundwater quality).

#### **AOC-2 – Vent Pipes**

A prior (2021) Phase I ESA also identified two vent pipes (reportedly associated with 19 Clay Street) and one suspected fill port and a corresponding floor anomaly within the 19 Clay Street building, consistent with a



potential UST. Several patches were noted with the concrete floors of both buildings. As no information was available regarding these suspected USTs, including their size, contents, current status, tank tightness test reports, or soil conditions in their vicinity was available for review, there is a potential for spills or releases from the UST(s) to have impacted the subsurface.

## 2.4 SURROUNDING LAND USE

The site is located within a densely developed mixed-use area. The following surrounding land uses were observed during the Phase I ESA site inspection:

North: Commercial Street and a 4-story residential building (74 Commercial Street), followed by a NYC Transit facility (65 Commercial Street), an undeveloped lot (33-35 Commercial Street) and a high-rise building under construction (1-3 Bell Slip).

South: Clay Street, followed by three 1-story industrial buildings (26-32 Clay Street), four 1- and 2-family residences (38-46 Clay Street) and a mixed-use (residential (48 Clay Street).

East: Vacant lot (29 Clay Street) and a 7-story mixed-use (retail residential) building (1133 Manhattan Avenue, followed by two mixed-use buildings and Manhattan Avenue.

West: A contractor storage yard (56 Commercial Street) and a building supply warehouse (15 Clay Street), followed by three undeveloped parcels used as a storage yard, with the intersection of Clay and Commercial Streets beyond.

## 2.5 HYDROGEOLOGIC SETTING

The Site is relatively flat and has no natural or artificial surface water bodies or impoundments. According to the most recent subsurface investigation conducted by Preferred, the depth to groundwater is approximately 6-feet below surface grade. It is anticipated that shallow groundwater flows to the northwest.

## 2.6 PROPOSED REDEVELOPMENT/PROJECT DESCRIPTION

This project is to investigate and remediate the site through the NYSDEC BCP. The project development will include renovation of the existing 10,200 sq ft warehouse building and construction of a mixed-use building. The existing warehouse building located at 19 Clay Street will be renovated into a two-story recreation space. A 20,000 sq ft mixed-use building including a six-story community facility space and a 2,200 sq ft ground floor retail space will be constructed at 60-62 Commercial Street.

## 3.0 **REMEDIAL INVESTIGATION**

### 3.1 OBJECTIVES

The objectives of the investigation phase of this project are to:

1. Determine the nature and extent of soil, groundwater and soil vapor at the Site; and,
2. Obtain the necessary information needed to design and implement a Remedial Action Work Plan (RAWP) for the Site.





Based on the soil vapor results from the previous remedial investigation, vapor intrusion evaluation is needed to understand the extent of the vapor intrusion at the site. The values of chlorinated VOC's were above the limits prescribed in Matrix 1 of the NYSDOH Soil Vapor intrusion Guidance, which suggests a vapor encroachment condition exists at the site. A soil vapor survey, including the collection of soil vapor samples throughout the interior and exterior of the property, identifying soil vapor quality impacted by chlorinated VOCs will be part of the scope of work along with soil and groundwater quality.

The names, contact information and roles of personnel who will participate in the investigation are included in the QAPP – Appendix A.

### 3.2 UTILITY CLEARANCE

GZA will retain a contractor to conduct a geophysical survey across the entire Site to scan the shallow subsurface for the presence of anomalies (e.g., underground storage tanks and associated piping, utilities, and foundation slabs). The geophysical survey will include one or more of the following techniques to assist in detecting subsurface anomalies: Ground Penetrating Radar (GPR), electromagnetic surveys and/or subsurface utility surveys. Anomalies detected by the geophysical survey will be marked with spray paint and/or flags. GZA personnel will be onsite to observe and document the survey. A written geophysical survey report and figure will be appended to the Remedial Investigation Report

Additionally, a mark-out of underground utility lines will be performed prior to the start of fieldwork by calling the New York City One-Call Center. A utility mark-out verification reference number for the Site will be obtained and a record of the utilities will be kept (e.g., Con Ed, Cablevision, etc.).

### 3.3 GROUNDWATER MONITORING WELLS

#### 3.3.1 Groundwater Monitoring Well Installation

A total of five (5) permanent groundwater monitoring well clusters will be installed through the Site. Each of the clusters will consist of two (2) monitoring wells. One 2-inch diameter monitoring well will be installed into the shallow groundwater and will be constructed with a 10-foot long 0.010-inch slotted well screen followed by a 10-foot riser. The second monitoring well will be screened from 30-40 feet bgs with a 0.010-inch slotted well screen followed by a 30-foot riser. The monitoring wells will be furnished with a flush-mount cap and a locking j-plug.

The following characteristics of each newly installed well will be recorded in the field logbook:

- Date/time of construction
- Drilling method used
- Approximate well location
- Borehole diameter and well casing diameter
- Well depth
- Drilling and lithologic logs



- Casing materials
- Screen materials and design
- Casing and screen joint type
- Screen slot size/length
- Filter pack material/size
- Filter pack placement method
- Sealant materials

A minimum of 24 hours after installation, the monitoring wells will be developed by surging/bailing, using a centrifugal pump and dedicated polyethylene tubing, or by Waterra positive displacement pumps and dedicated polyethylene tubing, or other methods at the discretion of the Field Manager/Site Supervisor. The development water will be contained in a tank on site or in drums to be provided by Aarco Environmental Services Corp. (AARCO), the drilling subcontractor. Wells will be developed until turbidity is less than 50 Nephelometric Turbidity Units (NTUs) for three (3) successive reading and until water quality indicators stabilized within 10% for pH, temperature, and specific conductivity for three successive readings, or until at least three well volumes are purged. All monitoring well development will be overseen by a field geologist and the duration, method of development, and approximate volume of water removed will be recorded in the field book.

### 3.3.2 Well Survey

The monitoring wells will be surveyed. The elevations of the top of the well casings will be surveyed by a licensed surveyor to the nearest 0.01 of a foot. The depth to water will be measured and a water table elevation contour map will be prepared. The water table contour map will also include the horizontal direction of groundwater flow.

### 3.3.3 Groundwater Monitoring Well Sampling

Groundwater samples will be collected from the ten (10) newly installed groundwater monitoring wells. All monitoring wells will be sampling in accordance with EPA's Low-Flow (minimal drawdown) Groundwater Sampling procedures.

Two (2) weeks after well development, the ten (10) groundwater monitoring wells will be sampled. The following materials, as required, shall be available during groundwater sampling:

- Sample pump (peristaltic)
- Sample tubing
- Power source (i.e., generator, battery)
- Appropriate health and safety equipment as specified in the HASP
- Dedicated or disposable bailers



- New disposable polypropylene rope
- Buckets to measure purge water
- Water-level interface probe
- Conductivity/temperature meter
- pH meter
- Turbidity meter
- Appropriate water sample containers
- Appropriate blanks (trip blank supplied by the laboratory)
- Appropriate transport containers (coolers) with ice and appropriate labeling, packing, and shipping materials
- Groundwater sampling logs
- COC forms
- Indelible ink pens
- Site map with well locations

Prior to sampling, groundwater elevations will be measured at each monitoring well and the presence of light non-aqueous phase liquid (LNAPL) or DNAPL (if any) within the well will be evaluated. Depth to water and depth to bottom measurements of each well will be collected using a sonic interface probe and recorded on the sampling log sheet.

After groundwater elevations are measured and NAPLs are determined not to be present, groundwater will be purged from the wells. If NAPLs are determined present, then a groundwater sample will not be collected, rather a representative NAPL sample may be collected (if required) using a peristaltic pump or other method determined by the Field Manager/Site Supervisor.

Tubing (for peristaltic pumps) will be lowered slowly into the well to a depth corresponding to the center of the saturated screen section of the well. Purging rates will not exceed 500 milliliters per minute. During well purging, monitor the field indicator parameters (turbidity, temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) every three to five minutes (or as appropriate). The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized (readings with 10% of prior reading for pH, conductivity, turbidity and DO and 10 +/- mV for ORP) for three consecutive readings. Readings will be recorded utilizing a Horiba multimeter with flow through cell or equivalent.

Groundwater samples will be collected directly from the decontaminated tubing into laboratory-issued bottle ware. The vials will be filled completely and checked to ensure that no air bubbles are present. Samples will be packaged in laboratory-issued sample contained by GZA personnel and stored on ice pending same day or overnight shipment to a New York State ELAP and Contract Laboratory Protocol (CLP)-Accredited laboratory subcontracted by GZA. All samples will be uniquely identified, and all information associated with the samples will be recorded utilizing standard



Chain-of-Custody (COC) sampling protocols. Sample containers will then be placed on ice until delivered to the laboratory.

Groundwater samples from each well will be analyzed for NYSDEC Full TCL/TAL List Volatile Organic Compounds (VOCs) by EPA Method 8260, Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270, Organochlorine Pesticides by USEPA Method 8081, Polychlorinated Biphenols (PCBs) by USEPA Method 8082, Chlorinated Herbicides by USEPA Method 8151 and Target Analyte list (TAL) Metals via EPA 6010/7471 Series, Per- and Polyfluoroalkyl Substances (PFAS) and 1,4-Dioxane. Sample analyses for Per- and Polyfluoroalkyl Substances (PFAS) and 1,4-dioxane will be conducted in accordance with the NYSDEC April 2023 Guidance for Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS). All analysis will be reported using NYSDEC ASP Category B deliverables.

During this round of sampling, the following samples will be collected for QA/QC purposes in accordance with the attached Quality Assurance Project Plan (QAPP) (Appendix A):

- 1 trip blank
- 1 field blank
- 1 duplicate sample
- 1 matrix spike and 1 matrix spike duplicate

The groundwater laboratory data will be reviewed by a qualified Data Validator and a Data Usability Summary Report (DUSR) will be prepared. The laboratory analytical results of the samples will be compared to NYSDEC TOGS groundwater standards and guidance values. Monitoring well installation logs will be generated and will be included as an Appendix in the Remedial Investigation Report. The logs will contain any local condition(s) that occurred during the sampling that may influence interpretation of the results (i.e., weather). Additionally, logs will include parameters recorded during low flow sampling, depth to water, depth to bottom, monitoring well screen information, and construction details. All purge water will be drummed and sampled for proper off-site disposal.

### 3.4 SOIL SAMPLING

Eleven (11) soil borings will be advanced to a maximum depth of approximately 40-ft bgs at pre-specified locations to further characterize the soil to the groundwater interface. Utilizing the Geoprobe drilling system, continuous soil samples will be collected and screened from each boring at two-foot depth intervals.

As requested by the Department, to further delineate the extent of shallow TCE impacts identified around SB-11 (1-3 ft bgs at 0.740 mg/kg) during the May 2023 investigation, up to four shallow (1-3 ft bgs) samples will be collected in the area of SB-11. These shallow soil samples will be analyzed for VOCs only by United State EPA Method 8260.

A GZA representative will oversee all soil boring activities; log (characterize) the shallow fill lithology and screen the subsurface earth materials (fill) samples with a PID. Organoleptic conditions will be noted for all samples.

A shallow soil sample will be collected from each boring at approximately 0-2- feet bgs and a second sample will be collected from the soil exhibiting the highest degree of impact based upon both a visual inspection and PID readings and/or the deepest sample above the groundwater interface for laboratory analysis. Soil borings will be advanced to a maximum depth of approximately 40-ft bgs.



Soil Samples will be submitted for laboratory analysis for NYSDEC Full TCL/TAL List Volatile Organic Compounds (VOCs) by EPA Method 8260, Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270, Organochlorine Pesticides by USEPA Method 8081, Polychlorinated Biphenols (PCBs) by USEPA Method 8082, Chlorinated Herbicides by USEPA Method 8151 and Target Analyte list (TAL) Metals via EPA 6010/7471 Series, Per- and Polyfluoroalkyl Substances (PFAS) and 1,4-Dioxane. Sample analyses for Per- and Polyfluoroalkyl Substances (PFAS) and 1,4-dioxane will be conducted in accordance with the NYSDEC April 2023 Guidance for Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS). All analysis will be reported using NYSDEC ASP Category B deliverables from an ELAP-certified laboratory.

All on-site sampling equipment will be decontaminated between each use in the following manner: laboratory grade detergent and freshwater wash using scrub brush, followed by two freshwater rinses and a final air dry. Gloves worn for sample handling will be discarded between sample collections. Each sample will be placed in sterilized laboratory supplied containers. The sampled earth material will be settled and capped to ensure that little or no headspace is present within the sample. Sample containers will then be placed on ice until delivered to the laboratory. All samples will be uniquely identified, and all information associated with the samples will be recorded utilizing standard chain-of-custody sampling protocols.

Following the completion of each boring, the boreholes will be backfilled with drill cuttings and then sealed with cement grout if no evidence of free product, NAPL, or grossly contaminated soil were identified during the advancement of the boring. If free product, NAPL, or grossly contaminated soil is identified, soil cuttings will be disposed of off-site in accordance with DER-10, see Section 3.6 for additional details. Boring logs will be generated for each borehole.

During this round of sampling, the following samples will be collected for QA/QC purposes in accordance with the attached Quality Assurance Project Plan (QAPP) (Appendix A):

- 1 trip blank – per day
- 1 field blank/20 samples
- 1 duplicate sample/20 samples
- 1 matrix spike and 1 matrix spike duplicate/20 samples

The soil laboratory data will be reviewed by a qualified Data Validator and a Data Usability Summary Report (DUSR) will be prepared. The laboratory analytical results of the samples will be compared to NYSDEC Part 375 standards and guidance values. Soil boring installation logs will be generated and will be included as an Appendix in the Remedial Investigation Report. The logs will contain any local condition(s) that occurred during the sampling that may influence interpretation of the results (i.e., weather).

### 3.5 SOIL VAPOR POINT INSTALLATION AND SAMPLING

Seven (7) soil vapor samples will be installed via a Geoprobe™ direct push technology throughout the Site in accordance with the NYSDOH “Guidance for Evaluating Soil Vapor Intrusion in the State of New York” dated October 2006.



A stainless-steel screen connected to ¼-inch poly-tubing tubing will be advanced to two-feet above the groundwater interface, approximately 4 feet below surface grade and capped with a sample fitting to allow for the collection of soil gas. The annular space around the stainless-steel screen will be packed with coarse sand to one foot above the screen, creating a sampling zone of one foot six inches. A three (3) foot bentonite seal will then be emplaced above the sampling zone. The remainder of the borehole will be backfilled with clean fill.

One (1) soil gas sample will be collected from each soil vapor point at least 24-hours after installation in accordance with NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006. Concurrently one outdoor air sample will be collected.

Prior to sampling, one-to-three volumes of soil gas will be purged from the soil vapor point using a calibrated air sampling pump. A bucket will be placed over the sample assembly and helium gas will be used to enrich the atmosphere around the sample location in combination with real-time air monitoring (for helium) to verify that ambient air was not infiltrating the sampling assembly during purging and sampling.

Once confirmed that ambient air is not being drawn into the assembly, the soil vapor will be screened for the presence of VOCs using a photoionization detector (PID). After field screening is completed, the tubing will be connected to the SUMMA canister and a soil vapor sample will be collected. The SUMMA canister regulators for the soil vapor, indoor air and outdoor air samples will be set to restrict the sample collection to not exceed 0.2 liters per minute over an eight-hour time period. The canister will be submitted to a NYSDOH-certified laboratory for analysis of VOCs via EPA method TO-15 under chain-of-custody documentation.

During this round of sampling, the following samples will be collected for QA/QC purposes in accordance with the attached Quality Assurance Project Plan (QAPP) (Appendix A):

- 1 duplicate sample

Sampling activities a sample log sheet will be complete for each sample summarizing the following:

- sample identification;
- date and time of sample collection;
- sampling depth/height;
- identity of samplers;
- sampling methods and devices;
- purge volumes;
- volume of soil vapor extracted;
- if canisters used, the vacuum before and after samples collected;
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
- chain of custody protocols and records used to track samples from sampling point to analysis.



Soil vapor point installation logs will be generated and will be included as an Appendix in the Remedial Investigation Report. The logs will contain any local condition(s) that occurred during the sampling that may influence interpretation of the results (i.e., weather).

The soil vapor laboratory data will be reviewed by a qualified data validator and a Data Usability Summary Report (DUSR) will be prepared in accordance with the QAPP.

### 3.6 DISPOSAL

Waste generated from remedial investigation activities including soil boring installation, soil vapor point installation, monitoring well installation, and subsequent sampling will be handled in accordance with DER-10 Section 3.3(e). Drill cuttings may be disposed at the site within the borehole that generated them within 24 inches of the surface unless:

- Free product, NAPL or grossly contaminated soil, are present in the cuttings;
- The borehole has penetrated an aquitard, aquiclude or other confining layer; or extends significantly into bedrock;
- Backfilling the borehole with cuttings will create a significant path for vertical movement of contaminants. Soil additives (bentonite) may be added to the cuttings to reduce permeability;
- The soil cannot fit into the borehole.

Those soil cuttings needing to be managed on-site will be containerized in properly labeled DOT approved 55-gallon drums for future off-site disposal at a permitted facility. All boreholes which require drill cuttings disposal would ultimately be backfilled with drill cuttings and cement grout. Disposable sampling equipment including spoons, gloves, bags, paper towels, etc. that came in contact with environmental media will be double bagged and disposed as municipal trash dumpster as non-hazardous trash.

### 3.7 EQUIPMENT DECONTAMINATION

An equipment decontamination area will be set up in a location close to, but segregated from, the work area. This decontamination area will be set up on top of a minimum 6-mil polyethylene liner (or equivalent quality plastic sheeting) and will include the following equipment: decontaminating cleaners and solutions, deionized water, sprayers, washing tubs, brushes and clean disposable latex and neoprene gloves. Gloves worn for sample handling will be discarded between sample collections.

All down-hole drilling equipment will be decontaminated upon arrival at the Site and between each use, e.g., augers, samplers, rods and plugs, etc. All re-usable sampling equipment, including bowls, trowels, and split-spoon samplers, etc. will be decontaminated with a three-step washing process that consists of a tap water rinse, an Alconox® and tap water wash, followed by a distilled water rinse. After each rinsing process the equipment will be allowed to air dry. The submersible pump used for groundwater sample collection will be decontaminated between sample collection by passing the detergent and water mixture through the pump, followed by two freshwater rinses.





### 3.8 SAMPLING QA/QC PROTOCOL

Field notes including observations of soil conditions, pertinent observations, diagrams (if appropriate) will be maintained, and appropriate photographs will be taken. A record of each sample, including any pertinent observations about the sample will be kept in a field notebook and/or appropriate logs and copies will be included in the Remedial Investigation Report.

### 3.9 AIR MONITORING

Air monitoring will be conducted for site workers and the community (Community Air Monitoring Program). Air monitoring results will be recorded in the field book during the investigation activities. Fugitive particulate (dust) generation that could affect site workers of the community is not expected for the following reasons:

- Most of the work area and the boring locations are paved with asphalt, gravel, or concrete; therefore, vehicle movement will not generate dust.
- Intrusive work is limited to boring. Sub-slab vapor point and well installation, which does not generate large volumes of soil cuttings or dust.

#### 3.9.1 Worker Air Monitoring

Air monitoring of the breathing zone will be performed periodically during drilling and sampling activities to document health and safety protection for the work team. VOCs will be monitored with a PID in accordance with the HASP (Appendix B). If air monitoring during intrusive operations identifies the presence of VOCs, the field engineer will follow the guidelines outlined in the HASP regarding action levels, permissible exposure, engineering controls, and personal protective equipment. If the VOC action level is exceeded, work will cease and the work location will be evacuated. Monitoring will continue until the levels drops to permissible limits, at which point, work will resume with continued monitoring. If high levels persist, field activities will be halted, and the work relocated to another area. If dust emissions are observed, work will stop and dust suppression measures (i.e., water spray) will be implemented.

#### 3.9.2 Community Air Monitoring Plan

In addition to air monitoring in the worker breathing zone, community air monitoring will be performed in compliance with the NYSDOH Generic Community Air Monitoring Plan (CAMP) during all intrusive work for the duration of the investigation. The CAMP is included in Appendix C. The CAMP will consist of continuous monitoring for VOCs and dust emissions during ground intrusive activities (i.e., soil boring and monitoring well installation). Concentrations of VOCs and dust emissions will be measured at both the upwind (one) and downwind (one) CAMP stations before the start of the RI to establish background concentrations. During the RI, VOCs and dust emissions will be measured at the start of each workday, and at one-minute intervals throughout the day at the downwind perimeter of the work zone, which will be established at points on the site where the general public or site employees may be present. VOC Monitoring will be conducted with a PID equipped with a 10.6 eV lamp. VOC community air monitoring requirements will be conducted until it is determined that the site is not a source of organic vapors. Dust emissions will be monitored using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM10) and capable of averaging a period of 15 minutes (or less) for comparison to the airborne particulate action level (e.g., DustTrak). If dust emissions are observed, work





will stop and dust suppression measures will be used. The results will be presented in the daily reports (see DER-10 for details).

### 3.10 HEALTHY & SAFETY

A site-specific Health and Safety Plan (HASP) has been prepared for the field portion of the Remedial Investigation. The HASP will cover all activities in the investigation area as well as, emergency procedures and available emergency services in proximity to the Site. All proposed work discussed in the RIWP will be conducted in accordance with the HASP. The HASP is included as Appendix B.

### 3.11 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

A Qualitative Human Health Exposure Assessment will be conducted in accordance with Appendix 3B of the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation. The assessment will be submitted in the RIR.

### 3.12 FISH AND WILDLIFE RESOURCE IMPACT ANALYSIS

A Fish and Wildlife Resource Impact Study is not required for this site according to DER-10 Section 3.10.

### 3.13 GREEN AND SUSTAINABLE REMEDIATION (GSR) PRACTICES

According to NYSDEC DER-31 Green Remediation guidance document, green Remediation approaches should be considered during site remediation. GZA and its subcontractors will incorporate sustainability practices to reduce the environmental footprint of the investigation and cleanup. In accordance with ASTM E2893-16e1 the project GSR goals include the following:

- To minimize total energy use and maximize use of renewable energy,
- To minimize air pollutants and greenhouse gas emissions,
- To minimize water, use and impact to water resources,
- To reduce, reuse and recycle materials and waste; and
- To protect land and ecosystems

GZA will incorporate best management practices to lower our environmental footprint during the investigation and remediation phase of the project. GZA will incorporate the following practicable measures during the planned scope of work:

1. Limit the use of generators, excavation equipment, and vehicles to reduce emissions.
2. Minimize truck travel for disposal of waste generated during the IRM implementation by selecting local disposal facilities.
3. Minimize waste disposal by reusing soil/fill that does not exhibit visual, olfactory, or PID evidence of contamination to backfill excavated areas.
4. Manage onsite resources and materials efficiently.



5. Use local subcontractors during IRM implementation to minimize vehicle emissions during commute.
6. Request IRM implementation subcontractors to use clean diesel equipment to reduce emissions.
7. Request project staff and subcontractors to use public transportation during IRM implementation to the extent practicable.
8. Reducing waste, increasing recycling and increasing reuse of materials that otherwise be considered waste.

As required a Climate screen checklist and an environmental footprint analysis has been completed for the project and are attached in Appendix E.

## **4.0 REPORTING**

### **4.1 REMEDIAL INVESTIGATION REPORTING**

Following completion of the RI and receipt of analytical data, an RIR will be prepared. The report will include:

- A summary of the site history and previous investigations
- A description of site conditions
- Sampling methodology and field observations
- An evaluation of the results and findings
- Conclusions and recommendations for any further assessment (if warranted), and remedial action objectives

The report will summarize the nature and extent of contamination at each area of concern and identify unacceptable exposure pathways (as determined through a Qualitative Human Health Exposure Assessment).

The report will include soil boring and well construction logs, sampling logs, tabulated analytical results, figures, and laboratory data packages. The tabulated analytical results will be organized in table format and include sample location, media sampled, sample depth, field/laboratory identification numbers, analytical results and the applicable Standards, Criteria, and Guidance (SCGs) pertaining to the site and contaminants of concern for comparison. The report will include scaled figures showing the locations of soil borings, monitoring wells, and sub-slab vapor points, sample concentrations above SCGs for each media, groundwater elevation contours and flow direction, and, if appropriate, groundwater contaminant concentration contours.

### **4.2 DAILY REPORTS**

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

- An update of progress made during the reporting day



- Locations of work and quantities of material imported and exported from the site
- References to alpha-numeric map for site activities
- A summary of any and all complaints with relevant details (names, phone numbers)
- A summary of CAMP findings, including exceedances
- An explanation of notable site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RIWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RIWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the site that identifies work areas. These reports will include a summary of CAMP results, odor and dust problems and corrective actions, and all complaints received from the public. The NYSDEC-assigned project number will appear on all reports.

#### 4.3 MONTHLY REPORTS

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

- Activities relative to the site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e., tons of material exported and imported, etc.)
- Description of approved activity modifications, including changes of work scope and/or
- Schedule Sampling results received following internal data review and validation, as applicable
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays

#### 5.0 **COMMUNITY RELATIONS**

A detailed mailing list of contact list of near residents, businesses, public officials and citizens groups is included in the BCP Application. We will update this list as needed to include any other interested parties.



## 6.0 SCHEDULE

The following Schedule is provided for the BCP Project:

| <u>Event</u>                              |                        | <u>Schedule</u>       |
|-------------------------------------------|------------------------|-----------------------|
| Remedial Investigation Work Plan and HASP | (with BCP Application) | June-July 2024        |
| Interim Remedial Measure Work Plan        | (with BCP Application) | July-August 2024      |
| Site Investigation Field Work             |                        | July 2024             |
| Remedial Investigation Report             |                        | August-September 2024 |



## TABLES

**Table 1**  
**Sample Summary**  
19 Clay Street and 60-62 Commercial Street, Brooklyn NY  
NYSDEC BCP Site No. C224390

| Sample Matrix | Sample ID              | Sample Location                                      | Depth                                                                | Rationale                                                                                    | Sample Analyses                                                                                                                                                                                                        |
|---------------|------------------------|------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Soil          | SB-15 - S<br>SB-15 - D | Central portion of lot 10 (60-62 Commercial Street)  | 0-2 feet bgs and highest impact or 1-foot interval above groundwater | To delineate the general soil quality of the lot                                             | TCL VOCs) by United State EPA Method 8260<br>TCL SVOC by EPA Method 8270<br>TAL metals by EPA Method 6000/7000 series<br>Pesticides/PCBs by EPA Method 8081/8082<br>1,4-Dioxane and PFAS                               |
| Soil          | SB-16 - S<br>SB-16 - D | Southwest of SB-8                                    | 0-2 feet bgs and highest impact or 1-foot interval above groundwater | To delineate soil quality southwest of SB-8                                                  | TCL VOCs) by United State EPA Method 8260<br>TCL SVOC by EPA Method 8270<br>TAL metals by EPA Method 6000/7000 series<br>Pesticides/PCBs by EPA Method 8081/8082<br>1,4-Dioxane and PFAS                               |
| Soil          | SB-17 - S<br>SB-17 - D | Northern property boundary of lot 9 (19 Clay Street) | 0-2 feet bgs and highest impact or 1-foot interval above groundwater | To delineate the soil quality near the adjacent property to the north (56 Commercial Street) | TCL VOCs) by United State EPA Method 8260<br>TCL SVOC by EPA Method 8270<br>TAL metals by EPA Method 6000/7000 series<br>Pesticides/PCBs by EPA Method 8081/8082<br>1,4-Dioxane and PFAS                               |
| Soil          | SB-18 - S<br>SB-18 - D | Central portion of lot 9 (19 Clay Street)            | 0-2 feet bgs and highest impact or 1-foot interval above groundwater | To delineate the general soil quality of the lot                                             | TCL VOCs) by United State EPA Method 8260<br>TCL SVOC by EPA Method 8270<br>TAL metals by EPA Method 6000/7000 series<br>Pesticides/PCBs by EPA Method 8081/8082<br>1,4-Dioxane and PFAS                               |
| Soil          | SB-19 - S<br>SB-19 - D | Southern boundary of lot 9 (19 Clay Street)          | 0-2 feet bgs and highest impact or 1-foot interval above groundwater | To delineate and monitor how soil quality changes throughout the site                        | TCL VOCs) by United State EPA Method 8260<br>TCL SVOC by EPA Method 8270<br>TAL metals by EPA Method 6000/7000 series<br>Pesticides/PCBs by EPA Method 8081/8082<br>1,4-Dioxane and PFAS                               |
| Soil          | TBD                    | In the area of SB-11                                 | 1-3 feet bgs                                                         | To delineate shallow TCE impacts identified during 2023 investigation                        | TCL VOCs by United States EPA Method 8260                                                                                                                                                                              |
| GW            | GW-9S                  | Southwest of GW-5                                    | 10-20 ft bgs                                                         | To delineate the groundwater quality leaving the site                                        | TCL VOCs by United States EPA Method 8260<br>TCL SVOCs by EPA Method 8270<br>TAL metals EPA Method 6010/7471 series<br>Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151<br>1,4-Dioxane and PFAS |
| GW            | GW-9D                  | Southwest of GW-5                                    | 30-40 ft bgs                                                         | To delineate the groundwater quality leaving the site                                        | TCL VOCs by United States EPA Method 8260<br>TCL SVOCs by EPA Method 8270<br>TAL metals EPA Method 6010/7471 series<br>Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151<br>1,4-Dioxane and PFAS |

**Table 1**  
Sample Summary  
19 Clay Street and 60-62 Commercial Street, Brooklyn NY  
NYSDEC BCP Site No. C224390

| Sample Matrix | Sample ID | Sample Location                | Depth        | Rationale                                                                                                                        | Sample Analyses                                                         |
|---------------|-----------|--------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|               |           |                                |              |                                                                                                                                  | TCL VOCs by United State EPA Method 8260                                |
| GW            | GW-10S    | Western boundary of the site   | 8-18 ft bgs  | To delineate the groundwater quality leaving the site and entering the adjacent property (56 Commercial Street)                  | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-10D    | Western boundary of the site   | 30-40 ft bgs | To delineate the groundwater quality leaving the site and entering the adjacent property (56 Commercial Street)                  | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-11S    | West of GW-7                   | 8-18 ft bgs  | To monitor groundwater quality entering the site                                                                                 | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-11D    | West of GW-7                   | 30-40 ft bgs | To monitor groundwater quality entering the site                                                                                 | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-12S    | Northwest of GW-8              | 8-18 ft bgs  | To delineate groundwater quality leaving the site and entering the adjacent properties (15 Clay Street and 56 Commercial Street) | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-12D    | Northwest of GW-8              | 30-40 ft bgs | To delineate groundwater quality leaving the site and entering the adjacent properties (15 Clay Street and 56 Commercial Street) | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-13S    | Southern boundary of the site  | 8-18 ft bgs  | To delineate groundwater quality entering the site and entering the adjacent property (15 Clay Street)                           | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| GW            | GW-13D    | Southern boundary of the site  | 30-40 ft bgs | To delineate groundwater quality entering the site and entering the adjacent property (15 Clay Street)                           | TCL VOCs by United States EPA Method 8260                               |
|               |           |                                |              |                                                                                                                                  | TCL SVOCs by EPA Method 8270                                            |
|               |           |                                |              |                                                                                                                                  | TAL metals EPA Method 6010/7471 series                                  |
|               |           |                                |              |                                                                                                                                  | Pesticides/PCBs/Chlorinated Herbicides by EPA Method 8081/8082 and 8151 |
|               |           |                                |              |                                                                                                                                  | 1,4-Dioxane and PFAS                                                    |
| Air           | SV-12     | GW-12                          | 4-6 ft bgs   | To monitor the movement of soil vapor near the adjacent properties (15 Clay Street and 56 Commercial Street)                     | TCL VOCs EPA Method TO-15                                               |
| Air           | SV-13     | GW-13                          | 4-6 ft bgs   | To monitor the movement of soil vapor near the adjacent property (15 Clay Street)                                                | TCL VOCs EPA Method TO-15                                               |
| Air           | SV-14     | Southeastern property boundary | 4-6 ft bgs   | To monitor the movement of soil vapor near the adjacent property (29 Clay Street)                                                | TCL VOCs EPA Method TO-15                                               |
| Air           | SV-15     | GW-11                          | 4-6 ft bgs   | To delineate the soil vapor quality to the north of SV-14                                                                        | TCL VOCs EPA Method TO-15                                               |

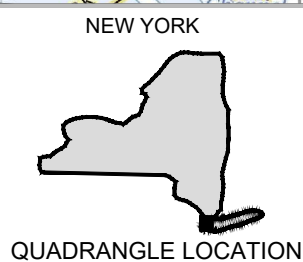
**Table 1**  
Sample Summary  
19 Clay Street and 60-62 Commercial Street, Brooklyn NY  
NYSDEC BCP Site No. C224390

| Sample Matrix | Sample ID | Sample Location                                                     | Depth                       | Rationale                                                                               | Sample Analyses                           |
|---------------|-----------|---------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------|-------------------------------------------|
|               |           |                                                                     |                             |                                                                                         | TCL VOCs) by United State EPA Method 8260 |
| Air           | SV-16     | Near SB-18                                                          | 4-6 ft bgs                  | To delineate the soil vapor quality of the central portion of the lot                   | TCL VOCs EPA Method TO-15                 |
| Air           | SV-17     | SB-17                                                               | 4-6 ft bgs                  | To monitor the movement of soil vapor near the adjacent property (56 Commercial Street) | TCL VOCs EPA Method TO-15                 |
| Air           | SV-18     | SB-19                                                               | 4-6 ft bgs                  | To monitor soil vapor quality near the southern end of the property                     | TCL VOCs EPA Method TO-15                 |
| Air           | IA-X      | Inside of the building located in 60-62 Commercial Street           | 2-4 ft above ground surface | To obtain indoor air quality to compare with the soil vapor                             | TCL VOCs EPA Method TO-15                 |
| Air           | OA-3      | Outside of the warehouse/storage building located in 19 Clay Street | 2-4 ft above ground surface | To obtain outdoor air quality to compare with the soil vapor                            | TCL VOCs EPA Method TO-15                 |



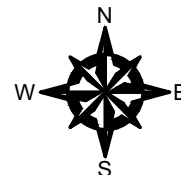


**FIGURES**



**SOURCE:**

USGS TOPOGRAPHIC MAPS: BROOKLYN, NY, NJ (2023).  
CONTOUR INTERVAL 10FT., NAVD-1988, ORIGINAL SCALE  
1:24,000 (1IN.=2,000FT.).



UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

|                                                                                            |                                                                                                                                                                                                       |                              |                                                          |                                                       |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------|-------------------------------------------------------|
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222 | <div>PREPARED BY:</div> <div> <b>GZA</b> GeoEnvironmental of NY<br/>Engineers and Scientists<br/>www.gza.com</div> |                              | <div>PREPARED FOR:</div> <div>CLAY PROPERTIES, LLC</div> |                                                       |
| <b>SITE LOCATION MAP</b>                                                                   | PROJ MGR: MH                                                                                                                                                                                          | REVIEWED BY: MH              | CHECKED BY: VW                                           | <b>FIGURE</b><br><br><b>1</b><br><br>SHEET NO. 1 OF 1 |
|                                                                                            | DESIGNED BY: SG                                                                                                                                                                                       | DRAWN BY: SG                 | SCALE: 1"=2000'                                          |                                                       |
|                                                                                            | DATE:<br>JUNE 2024                                                                                                                                                                                    | PROJECT NO.<br>41.0163279.00 | REVISION NO.<br>-                                        |                                                       |
|                                                                                            |                                                                                                                                                                                                       |                              |                                                          |                                                       |



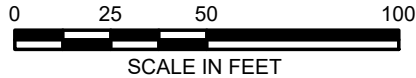
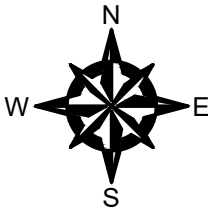


**GENERAL NOTES**

1. AERIAL IMAGERY DEVELOPED FROM (C) MICROSOFT CORPORATION (C) 2023 MAXAR (C) CNES (2023) DISTRIBUTION AIRBUS DS.
2. BASE MAP ADAPTED FROM DRAWING TITLED "FIGURE 2 – AERIAL PHOTOGRAPH", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 50', DATED FEBRUARY 2024.

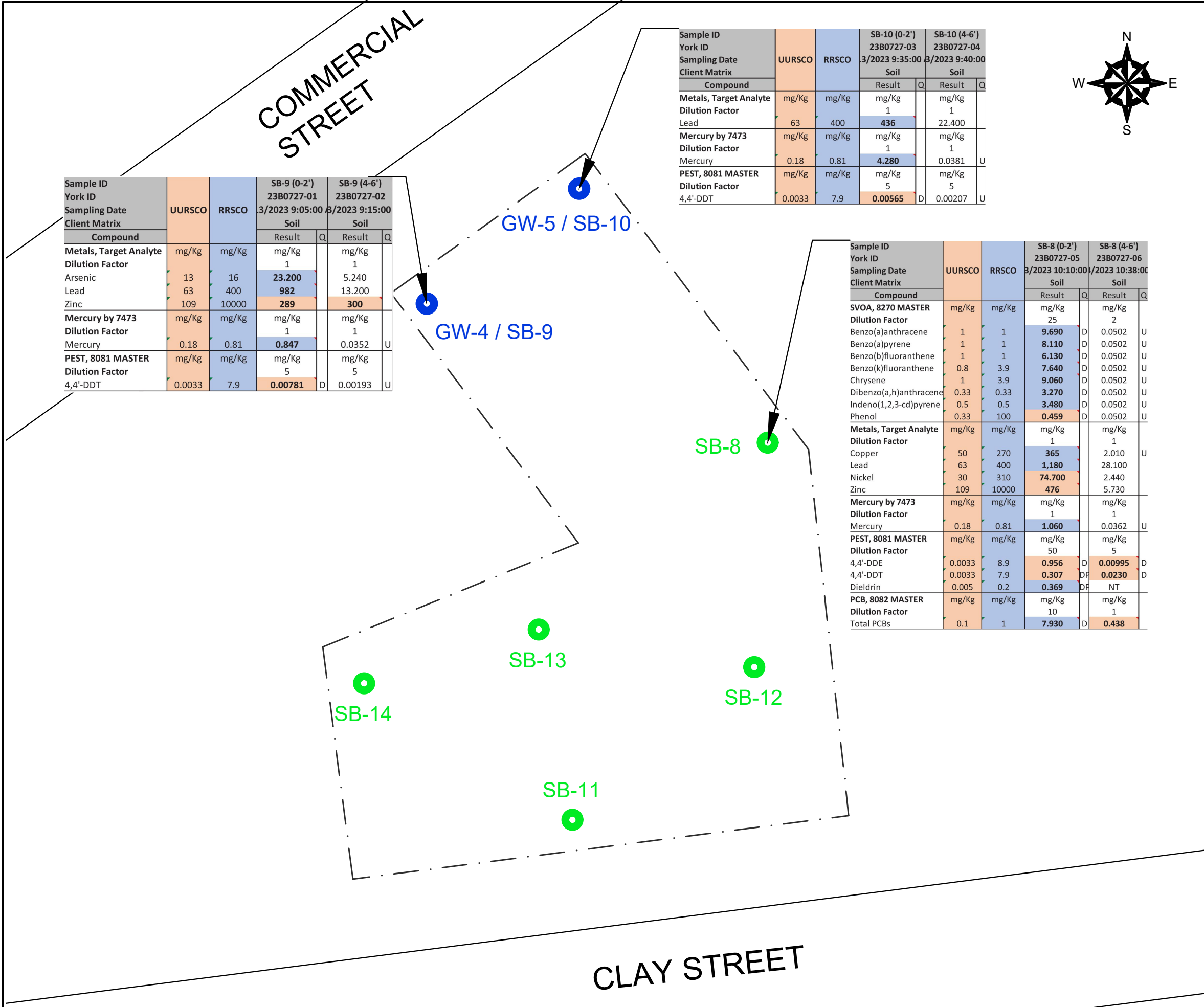
**LEGEND**

 APPROXIMATE SITE BOUNDARY



| NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ISSUE/DESCRIPTION | BY | DATE |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----|------|
| UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA. |                   |    |      |

|                                                                                            |  |                                                                                                                                                                                    |                              |                                           |                                                       |
|--------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------|-------------------------------------------------------|
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222 |  | PREPARED BY:<br> <b>GZA</b> GeoEnvironmental of NY<br>Engineers and Scientists<br>www.gza.com |                              | PREPARED FOR:<br><br>CLAY PROPERTIES, LLC |                                                       |
| <b>AERIAL MAP</b>                                                                          |  | PROJ MGR: MH                                                                                                                                                                       | REVIEWED BY: MH              | CHECKED BY: VW                            | <b>FIGURE</b><br><br><b>2</b><br><br>SHEET NO. 1 OF 1 |
|                                                                                            |  | DESIGNED BY: SG                                                                                                                                                                    | DRAWN BY: SG                 | SCALE: 1" = 50'                           |                                                       |
|                                                                                            |  | DATE:<br>JUNE, 2024                                                                                                                                                                | PROJECT NO.<br>41.0163279.00 | REVISION NO.<br>-                         |                                                       |

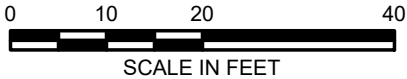


GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. PROPOSED EXPLORATION LOCATIONS MAY BE ADJUSTED IN THE FIELD DUE TO THE PRESENCE OF UNDERGROUND UTILITIES OR OBSTRUCTIONS.

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE SOIL SAMPLING LOCATION
- APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION



| NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ISSUE/DESCRIPTION         | BY                                    | DATE             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------|------------------|
| UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA. GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA. |                           |                                       |                  |
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                           |                                       |                  |
| PROPOSED SAMPLING LOCATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                           |                                       |                  |
| PREPARED BY:<br>GZA GeoEnvironmental of NY<br>Engineers and Scientists<br>www.gza.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                           | PREPARED FOR:<br>CLAY PROPERTIES, LLC |                  |
| PROJ MGR: MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | REVIEWED BY: MH           | CHECKED BY: VW                        | FIGURE           |
| DESIGNED BY: SG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DRAWN BY: SG              | SCALE: 1" = 20'                       | 6                |
| DATE: JUNE, 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PROJECT NO. 41.0163279.00 | REVISION NO. -                        |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                           |                                       | SHEET NO. 1 OF 1 |



©2022 – GZA GeoEnvironmental of NY.  
GZA-J:\Active 163299 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 Figure 4.dwg [FIG 4] June 19, 2024 – 5:38pm Sella.Gupta

| Sample ID<br>York ID<br>Client Matrix | NYSDEC TOGS<br>Standards and<br>Guidance Values | GW-4<br>23B0727-09<br>Water |   |
|---------------------------------------|-------------------------------------------------|-----------------------------|---|
| Compound                              | - GA                                            | Result                      | Q |
| VOA, 8260 LOW MASTER                  | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 1                           |   |
| Trichloroethylene                     | 5                                               | 11.9                        |   |
| Metals, Target Analyte, ICP           | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 1                           |   |
| Sodium                                | 20000                                           | 29,700                      |   |
| Metals, Target Analyte, ICP D         | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 1                           |   |
| Sodium                                | 20000                                           | 31,900                      |   |
| Mercury by 7470/7471                  | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 10                          |   |
| Mercury                               | 0.7                                             | 2                           | U |

| Sample ID<br>York ID<br>Client Matrix | NYSDEC TOGS<br>Standards and<br>Guidance Values | GW-8<br>23E0792-03<br>Water |  |
|---------------------------------------|-------------------------------------------------|-----------------------------|--|
| Compound                              | - GA                                            | Result                      |  |
| VOA, 8260 LOW MASTER                  | ug/L                                            | ug/L                        |  |
| Dilution Factor                       |                                                 | 1                           |  |
| Trichloroethylene                     | 5                                               | 19.4                        |  |

| Sample ID<br>York ID<br>Client Matrix | NYSDEC TOGS<br>Standards and<br>Guidance Values | GW-6<br>23E0792-01<br>Water |  |
|---------------------------------------|-------------------------------------------------|-----------------------------|--|
| Compound                              | - GA                                            | Result                      |  |
| VOA, 8260 LOW MASTER                  | ug/L                                            | ug/L                        |  |
| Dilution Factor                       |                                                 | 1                           |  |
| Trichloroethylene                     | 5                                               | 86.6                        |  |

| Sample ID<br>York ID<br>Client Matrix | NYSDEC TOGS<br>Standards and<br>Guidance Values | GW-5<br>23B0727-08<br>Water |   |
|---------------------------------------|-------------------------------------------------|-----------------------------|---|
| Compound                              | - GA                                            | Result                      | Q |
| VOA, 8260 LOW MASTER                  | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 1                           |   |
| cis-1,2-Dichloroethylene              | 5                                               | 10.4                        |   |
| Trichloroethylene                     | 5                                               | 19.5                        |   |
| Metals, Target Analyte, ICP           | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 1                           |   |
| Lead                                  | 25                                              | 75.4                        |   |
| Manganese                             | 300                                             | 660                         |   |
| Metals, Target Analyte, ICP D         | ug/L                                            | ug/L                        |   |
| Dilution Factor                       |                                                 | 1                           |   |
| Lead                                  | 25                                              | 69                          |   |
| Manganese                             | 300                                             | 700                         |   |

| Sample ID<br>York ID<br>Client Matrix | NYSDEC TOGS<br>Standards and<br>Guidance Values | GW-7<br>23E0792-02<br>Water |  |
|---------------------------------------|-------------------------------------------------|-----------------------------|--|
| Compound                              | - GA                                            | Result                      |  |
| VOA, 8260 LOW MASTER                  | ug/L                                            | ug/L                        |  |
| Dilution Factor                       |                                                 | 1                           |  |
| Trichloroethylene                     | 5                                               | 142.0                       |  |

#### GENERAL NOTES

- AERIAL IMAGERY DEVELOPED FROM (C) 2023 MICROSOFT CORPORATION (C) 2023 MAXAR (C) CNES (2023) DISTRIBUTION AIRBUS DS.
- BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 4 – GROUNDWATER SAMPLE RESULTS OVER TOGS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 50, DATED FEBRUARY 2024.

#### LEGEND



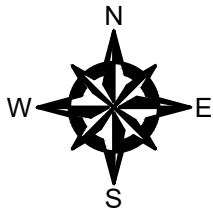
APPROXIMATE SITE BOUNDARY



APPROXIMATE GROUNDWATER SAMPLE LOCATIONS

0 25 50 100

SCALE IN FEET



© 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                           |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------|----------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                           |                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                           |                                        |
| NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ISSUE/DESCRIPTION            | BY                                        | DATE                                   |
| UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA. |                              |                                           |                                        |
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |                                           |                                        |
| GROUNDWATER SAMPLE RESULTS OVER TOGS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                              |                                           |                                        |
| PREPARED BY:<br> <b>GZA</b> GeoEnvironmental of NY<br>Engineers and Scientists<br>www.gza.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              | PREPARED FOR:<br><br>CLAY PROPERTIES, LLC |                                        |
| PROJ MGR: MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | REVIEWED BY: VW              | CHECKED BY: MH                            | FIGURE<br><b>4</b><br>SHEET NO. 1 OF 1 |
| DESIGNED BY: MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DRAWN BY: SG                 | SCALE: 1" = 50'                           |                                        |
| DATE:<br>JUNE 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | PROJECT NO.<br>41.0163279.00 | REVISION NO.<br>-                         |                                        |

©2022 – GZA GeoEnvironmental of NY.  
GZA-J:\Active 163299 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 Figure 5.dwg [FIG 5] June 19, 2024 – 5:58pm Sella.Gupta



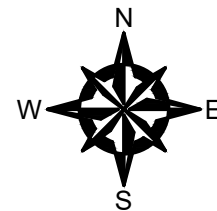
## GENERAL NOTES

- AERIAL IMAGERY DEVELOPED FROM (C) 2023 MICROSOFT CORPORATION (C) 2023 MAXAR (C) CNES (2023) DISTRIBUTION AIRBUS DS.
- BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 5 – SOIL VAPOR ANALYTICAL RESULTS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 50, DATED FEBRUARY 2024.

## LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE SOIL VAPOR SAMPLE LOCATIONS
- APPROXIMATE OUTDOOR AIR SAMPLE LOCATION

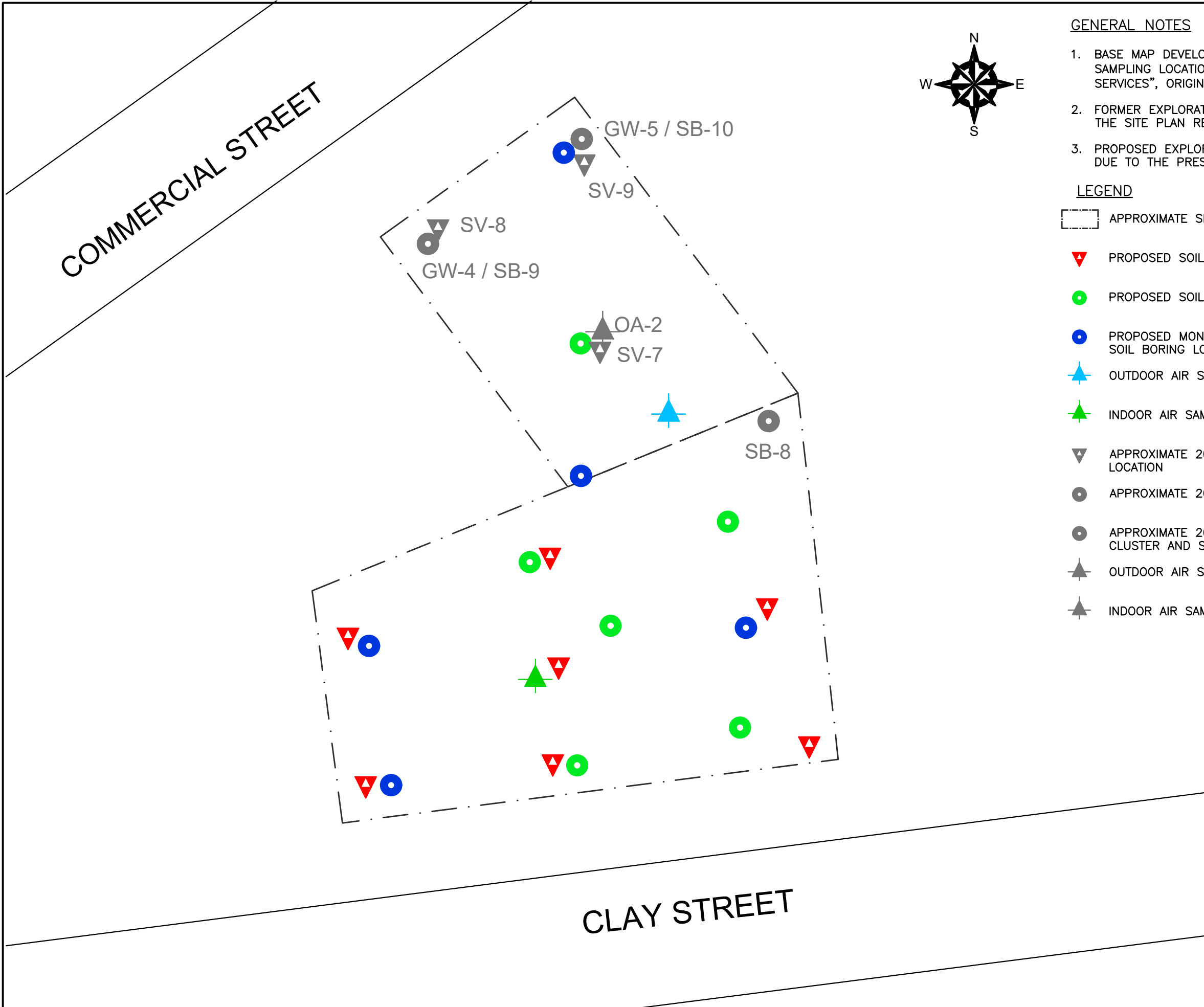
0 25 50 100  
SCALE IN FEET



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |                                       |                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------|---------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |                                       |                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           |                                       |                                 |
| NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ISSUE/DESCRIPTION         | BY                                    | DATE                            |
| UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA. |                           |                                       |                                 |
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                           |                                       |                                 |
| SOIL VAPOR ANALYTICAL RESULTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                           |                                       |                                 |
| PREPARED BY:<br>GZA GeoEnvironmental of NY<br>Engineers and Scientists<br>www.gza.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           | PREPARED FOR:<br>CLAY PROPERTIES, LLC |                                 |
| PROJ MGR: MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | REVIEWED BY: VW           | CHECKED BY: MH                        | FIGURE<br>5<br>SHEET NO. 1 OF 1 |
| DESIGNED BY: MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DRAWN BY: SG              | SCALE: 1" = 50'                       |                                 |
| DATE: JUNE 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PROJECT NO. 41.0163279.00 | REVISION NO. -                        |                                 |



©2022 – GZA GeoEnvironmental of NY.  
GZA-J:\Active 163299 to 163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\41.0163279.00 Figures 1,2,3,6.dwg [FIG 6 – SAMPLING LOCATIONS] June 19, 2024 – 10:19am Sella.Gupta

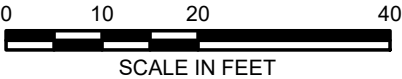


GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. PROPOSED EXPLORATION LOCATIONS MAY BE ADJUSTED IN THE FIELD DUE TO THE PRESENCE OF UNDERGROUND UTILITIES OR OBSTRUCTIONS.

LEGEND

- APPROXIMATE SITE BOUNDARY
- PROPOSED SOIL VAPOR SAMPLING LOCATION
- PROPOSED SOIL SAMPLING LOCATION
- PROPOSED MONITORING WELL CLUSTER AND SOIL BORING LOCATION
- OUTDOOR AIR SAMPLING LOCATION
- INDOOR AIR SAMPLING LOCATION
- APPROXIMATE 2023 REMEDIAL INVESTIGATION SOIL VAPOR SAMPLING LOCATION
- APPROXIMATE 2023 REMEDIAL INVESTIGATION SOIL SAMPLING LOCATION
- APPROXIMATE 2023 REMEDIAL INVESTIGATION MONITORING WELL CLUSTER AND SOIL BORING LOCATION
- OUTDOOR AIR SAMPLING LOCATION
- INDOOR AIR SAMPLING LOCATION



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                           |                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------|----------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                           |                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                              |                                           |                                        |
| NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ISSUE/DESCRIPTION            | BY                                        | DATE                                   |
| UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEORENVIROMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA. |                              |                                           |                                        |
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                              |                                           |                                        |
| PROPOSED SAMPLING LOCATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                              |                                           |                                        |
| PREPARED BY:<br> <b>GZA</b> GeoEnvironmental of NY<br>Engineers and Scientists<br>www.gza.com                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                              | PREPARED FOR:<br><br>CLAY PROPERTIES, LLC |                                        |
| PROJ MGR: MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | REVIEWED BY: MH              | CHECKED BY: VW                            | FIGURE<br><b>6</b><br>SHEET NO. 1 OF 1 |
| DESIGNED BY: SG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DRAWN BY: SG                 | SCALE: 1" = 20'                           |                                        |
| DATE:<br>JUNE, 2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PROJECT NO.<br>41.0163279.00 | REVISION NO.<br>-                         |                                        |



June 2024  
File No. 41.0163263.00  
QAPP/FSP – 55 Eckford Street, Brooklyn, NY

## **ATTACHMENTS**





## **APPENDIX A – QUALITY ASSURANCE PROJECT PLAN (QAPP)**



Known for excellence.  
Built on trust.

## **QUALITY ASSURANCE PROJECT PLAN (QAPP) / FIELD SAMPLING PLAN (FSP)**

**19 Clay Street and 60-62 Commercial Street  
Block 2482, Lot 9  
Brooklyn, New York  
NYSDEC BCP Site No. C224390**

June 2024

### **PREPARED FOR:**

**Clay Properties, LLC**

134 North 4<sup>th</sup> Street  
Brooklyn, NY, 11249

### **PREPARED BY:**

**Goldberg Zoino Associates of New York, P.C.**

**d/b/a GZA GeoEnvironmental of New York**

104 West 29th Street, 10th Floor  
New York, NY 10001

File No. 41.0163279.00



## TABLE OF CONTENTS

|            |                                                      |           |
|------------|------------------------------------------------------|-----------|
| <b>1.0</b> | <b>INTRODUCTION .....</b>                            | <b>1</b>  |
| <b>2.0</b> | <b>PROJECT ORGANIZATION AND RESPONSIBILITY .....</b> | <b>1</b>  |
| <b>3.0</b> | <b>QA OBJECTIVES FOR DATA MANAGEMENT .....</b>       | <b>2</b>  |
| <b>4.0</b> | <b>SAMPLING PLAN .....</b>                           | <b>4</b>  |
| 4.1.       | UTILITY CLEARANCE .....                              | 5         |
| 4.2.       | TEST PIT SOIL SAMPLING .....                         | 5         |
| 4.3.       | DIRECT PUSH DRILLING SOIL SAMPLING .....             | 6         |
| 4.4.       | SONIC DRILL RIG SOIL SAMPLING .....                  | 6         |
| 4.5.       | TEMPORARY WELL POINT INSTALLATION AND SAMPLING.....  | 8         |
| 4.6.       | PERMANENT WELL INSTALLATION AND SAMPLING .....       | 8         |
| 4.6.1.     | <i>Well Installation/Construction.....</i>           | <i>8</i>  |
| 4.6.2.     | <i>Well Development .....</i>                        | <i>9</i>  |
| 4.6.3.     | <i>Well Purging .....</i>                            | <i>9</i>  |
| 4.6.4.     | <i>Well Sampling.....</i>                            | <i>10</i> |
| 4.7.       | BOREHOLE ABANDONMENT .....                           | 10        |
| 4.8.       | MONITORING WELL ABANDONMENT .....                    | 10        |
| 4.9.       | SOIL REUSE AND WORKER HEALTH & SAFETY SAMPLING ..... | 11        |
| 4.10.      | WASTE CHARACTERIZATION SAMPLING.....                 | 11        |
| 4.10.1.    | <i>Solid Waste .....</i>                             | <i>11</i> |
| 4.10.2.    | <i>Liquid Waste .....</i>                            | <i>11</i> |
| 4.10.3.    | <i>Grab versus Composite Sampling .....</i>          | <i>12</i> |
| 4.11.      | SOIL GAS SAMPLING .....                              | 12        |
| 4.12.      | AMBIENT AIR SAMPLING .....                           | 13        |
| 4.13.      | QC SAMPLE COLLECTION.....                            | 13        |
| 4.14.      | SAMPLE PRESERVATION AND CONTAINERIZATION .....       | 14        |
| 4.15.      | EQUIPMENT DECONTAMINATION.....                       | 14        |
| <b>5.0</b> | <b>DOCUMENTATION AND CHAIN-OF-CUSTODY .....</b>      | <b>15</b> |
| 5.1.       | SAMPLE COLLECTION DOCUMENTATION .....                | 15        |
| 5.1.1.     | <i>Field Notes .....</i>                             | <i>15</i> |
| 5.1.2.     | <i>Chain-of-Custody Records.....</i>                 | <i>16</i> |
| 5.1.3.     | <i>Sample Labeling.....</i>                          | <i>16</i> |
| 5.2.       | SAMPLE CUSTODY .....                                 | 18        |
| 5.2.1.     | <i>Field Custody Procedures.....</i>                 | <i>19</i> |
| 5.2.2.     | <i>Laboratory Custody Procedures.....</i>            | <i>20</i> |
| <b>6.0</b> | <b>CALIBRATION PROCEDURES .....</b>                  | <b>20</b> |
| 6.1.       | FIELD INSTRUMENTS .....                              | 20        |



|             |                                                          |           |
|-------------|----------------------------------------------------------|-----------|
| 6.2.        | LABORATORY INSTRUMENTS .....                             | 21        |
| <b>7.0</b>  | <b>SAMPLE PREPARATION AND ANALYTICAL PROCEDURES.....</b> | <b>21</b> |
| <b>8.0</b>  | <b>DATA REDUCTION, VALIDATION, AND REPORTING.....</b>    | <b>21</b> |
| 8.1.        | DATA EVALUATION/VALIDATION .....                         | 21        |
| 8.1.1.      | Field Data Evaluation.....                               | 21        |
| 8.1.2.      | Data Usability.....                                      | 22        |
| 8.2.        | IDENTIFICATION AND TREATMENT OF OUTLIERS .....           | 22        |
| <b>9.0</b>  | <b>INTERNAL QUALITY CONTROL.....</b>                     | <b>23</b> |
| <b>10.0</b> | <b>CORRECTIVE ACTION.....</b>                            | <b>23</b> |
| 10.1.       | IMMEDIATE CORRECTIVE ACTION.....                         | 24        |

## FIGURES

FIGURE 1 Site Location Plan

## TABLE

|          |                                                                                       |
|----------|---------------------------------------------------------------------------------------|
| TABLE 1A | Soil Criteria Table                                                                   |
| TABLE 1B | Groundwater Criteria Table                                                            |
| TABLE 1C | Soil Vapor Criteria Table                                                             |
| TABLE 2  | Analytical Parameters, Methods, Preservation, Holding Time and Container Requirements |
| TABLE 3  | Typical Laboratory Data Quality Objectives: Soil, Sediment and Solid Waste Samples    |
| TABLE 4  | Typical Laboratory Data Quality Objectives: Aqueous Samples                           |
| TABLE 5  | Typical Laboratory Data Quality Objectives: Soil Gas Samples                          |
| TABLE 6  | QC Sample Preservation and Container Requirements                                     |

## ATTACHMENTS

ATTACHMENT A Qualifications



## 1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures associated with the Remedial Investigation Work Plan (RIWP) at t19 Clay Street and 60-62 Commercial Street, Brooklyn, New York (the Site (Site)). **Figure 1** presents a Site location map.

This QAPP/FSP describes specific protocols for field sampling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the Plan was based on EPA Quality Assurance Project Plan guidance documents, including:

*EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5, March 2001); and

*Guidance for Quality Assurance Project Plans* (EPA QA/G-5, December 2002).

The data generated from the analysis of samples will be used to determine the extent of contamination, identify impacted targets, and to compare the results of the remedial actions to site-specific cleanup goals. Potential parameters to be analyzed, including their respective quantitation limits (QLs), and data quality levels (DQLs), are provided in **Tables 1A through 1C**.

## 2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

A qualified person will coordinate and manage the Site sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting. A Stephen M. Kline, P.E. is a qualified environmental professional (QEP), as defined by the New York State Department of Environmental Conservation (NYSDEC) and will direct the sampling activities and coordinate laboratory and drilling activities. The intent of this QAPP/FSP is to be performed the RI in accordance with the technical guidance applicable to Technical Guidance for Site Investigation and Remediation (DER-10), and Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs dated April 2023.

A qualified person will ensure that the QA/QC plan is implemented and will oversee data validation. GZA's Senior Technical Specialist, Dr. Chunhua Liu will provide oversight and technical support for the sampling and analytical procedures followed acting as the project QA Officer. This individual has the broad authority to approve or disapprove project plans, specific analyses, and final reports. The QEP is independent from the data generation activities. In general, the QA officer will be responsible for reviewing and advising on all QA/QC aspects of this program.

Laboratories used will be New York State Department of Health Environmental (NYSDOH) Laboratory Approval Program (ELAP) certified laboratories. The laboratories will communicate directly with the sampler regarding the analytical results and reporting and will be responsible for providing all labels, sample containers, field blank water, trip blanks, shipping coolers, and laboratory documentation. Qualifications of the QA officer are provided in **Attachment A**.



### 3.0 QA OBJECTIVES FOR DATA MANAGEMENT

The analytical data will be provided by the laboratory using the NYSDEC Category B deliverable format. Analytical data collected for disposal characteristics that may be requested by off-site soil or wastewater disposal facilities will be provided in the format that the facility requests.

All analytical measurements will be made so that the results are representative of the media sampled and the conditions measured. Data will be reported in consistent dry weight units for solid samples [i.e., micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) and/or milligram per kilogram ( $\text{mg}/\text{kg}$ ), micrograms per liter ( $\mu\text{g}/\text{L}$ ) or milligrams per liter ( $\text{mg}/\text{L}$ ) for aqueous samples and in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) for soil vapor and air samples. **Table 2** presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses. Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this Site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this QAPP/FSP.

**Tables 3, 4, and 5** present the precision and accuracy requirements for each parameter to be analyzed. For quantitation limits for parameters associated with soil, sediment, and solid waste samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits listed in 6 NYCRR Part 375.

For quantitation limits for parameters associated with groundwater samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits for groundwater from the Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values. In certain instances, if the TOGS criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit.

For quantitation limits for parameters associated with soil gas samples, the laboratory will be required to meet the parameter-specific limits from EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), Table 3c-SG:





Question 5 Soil Gas Screening Levels for Scenario-Specific Vapor Attenuation Factors ( $\alpha=2H10^{-3}$ ), November 2002. In certain instances, if these criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limits (see **Tables 1A through 1C** for affected analytes).

The QA objectives are defined as follows:

**Accuracy** is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of “standards,” materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. **Tables 3, 4, and 5** summarize the laboratory accuracy requirements.

**Precision** is the agreement among a set of replicate measurements without consideration of the “true” or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). Field duplicates will be collected at a frequency of one per twenty investigative samples per matrix per analytical parameter, with the exception of the Toxicity Characteristic Leaching Procedure (TCLP) parameters and parameters associated with wastewater samples. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be  $\leq 50$  for soil samples and  $\leq 30$  for aqueous samples. These criteria apply only if the sample and/or duplicate results are  $>5x$  the quantitation limit; if both results are  $\leq 5x$  the quantitation limit, the criterion will be doubled. Due to the uncertainty of available representative soil gas volume, field duplicates will not be collected for this matrix.

Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic soil, sediment and water analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicates and field duplicates. For soil gas analyses, laboratory precision will be assessed through the analysis of matrix duplicates. MS/MSD samples



or matrix duplicates will be performed at a frequency of one per twenty investigative samples per matrix per parameter. **Tables 3, 4, and 5** summarize the laboratory precision requirements.

**Completeness** is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. “Normal conditions” are defined as the conditions expected if the sampling plan was implemented as planned.

Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

**Representativeness** is a qualitative parameter that expresses the degree to which data accurately and precisely represent either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data. In addition, field duplicate samples will provide an additional measure of representativeness at a given location.

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed, and that proper sampling, sample handling, and sample preservation techniques are used.

Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times.

**Comparability** expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used.

Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

#### 4.0 SAMPLING PLAN

Environmental sampling may include soil, groundwater, soil vapor and sediment sampling. Additionally, wastes generated during remediation or development will be sampled and tested for characterization for disposal. Direct push drilling (GeoProbe®), sonic drilling, and/or test pit excavations will be the preferred methods for obtaining subsurface soil samples. However, other drilling methods including mud rotary and drive and wash may also be used if warranted by site conditions. Hand auger and/or hand-held sampling equipment will be the preferred method for collecting surficial and/or shallow soil



samples. Groundwater samples will be collected using bailers or peristaltic, bladder or submersible pumps. Soil vapor samples will be collected in SUMMA® canisters. Performing grab or composite sampling using appropriate hand-held sampling equipment will be the preferred method for waste characterization sampling.

#### **4.1. Utility Clearance**

New York State law requires that New York 811 be notified at least three working days prior to subsurface work is conducted to initiate the utility locating activities. Companies with subsurface utilities present will locate and mark out subsurface utility lines. However, New York 811 contractors will only locate utilities on public property and rights-of-way.

During the recent, subsurface investigations, GZA contracted for underground utilities within the Site, including electric lines, gas lines, storm and sanitary sewers, and communication lines will need to be located by survey and geophysical survey. If additional subsurface utility locating is considered necessary, a private locating company will be contracted to locate on-site utilities that have not been identified by New York 811 contractors or the Owner.

#### **4.2. Test Pit Soil Sampling**

Test pitting and/or excavating may be conducted during the RI, if necessary. Test pits will allow for visual characterization of subsurface soil conditions and the collection of grab soil samples. Prior to soil sample collection, headspace screening will be conducted to evaluate whether analysis of soil samples is warranted, and if so, which soils should be collected.

Prior to completing a test pit or excavation, underground utilities should be identified as discussed in **Section 4.1**. Should active, underground utilities be located in the vicinity of the intended excavation, hand or vacuum excavation methods should be employed, as appropriate, to confirm the location and depth prior to initiating the excavation.

The size and type of excavator used to complete the test pits will be selected based on the anticipated depth and overall size of the excavation required to meet the project objectives. At no time will field personnel enter a test pit/excavation unless it has been deemed safe to enter by an Excavation Competent person based on training and experience required by 29CFR 1926.652.

Grab soil/solid samples will be collected from the material or interval in question by retrieving a volume for analysis using a clean stainless steel, aluminum, or mild steel/ disposable scoop, trowel, spoon, or bucket auger and placing the soil in a cleaned stainless steel pan for homogenization before inserting into the sample container. Samples collected for analysis for volatile organic compounds and total organic halides will not be homogenized. Samples for volatile organics analysis and total organic halides will be placed directly into the sample container.

Composite samples will be collected in the same manner described above, except that the discrete sample volumes will be placed in a clean stainless steel pan and mixed to form the composite. Composite sampling will be performed for the following objectives:



- Waste characterization;
- Determination of the suitability of the soil for on-site re-use; and
- Evaluation of health and safety requirements for workers that will disturb the soil during subsequent construction work.

#### **4.3. Direct Push Drilling Soil Sampling**

This drilling method is typically used to collect shallow overburden soils and create boreholes for temporary monitoring well installations, or soil vapor sampling points. Sampling will be performed using four or five-foot-long acetate sleeves that will be advanced continuously to the desired depth below the surface. Soil samples from each sleeve will be screened using a photoionization detector (PID) to detect possible organic vapors. Organic vapor screening will be performed by slicing open the acetate sleeve, making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however, this decision will be field-based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Clean metal/disposable instruments will be used to transfer samples. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4°C.

#### **4.4. Sonic Drill Rig Soil Sampling**

The sonic drilling system employs simultaneous high frequency vibration and low speed rotational motion along with down pressure to advance the cutting shoes of the drill string. This technique provides a continuous soil core and generates minimal cuttings. Due to the continuous sampling of the system,



accurate depictions of the stratigraphy and lithology of the overburden are obtained (minimal sloughing). Additionally, few cuttings are mobilized to the surface. Most of the formation material enters the core barrel, except small amounts, which are pushed into the borehole wall.

Drilling operations take place from the drill platform, which is about 4 feet above ground. Steel drill casing and core barrel are connected to the head from the work platform/support truck and are then hoisted to vertical in the derrick. Tool joints are connected and broken by a hydraulic vise/wrench that is in the base of the derrick. The sonic head is able to pivot 90 degrees to facilitate connection of the drilling rods.

The sonic drilling system uses an override core barrel system and can create a 4- or 6-inch diameter borehole. This is followed by the override casing drilled to the same depth as the core barrel cutting shoe. The core barrel is then removed, and cores are extruded into plastic sleeves. The outer casing prevents cross contamination and formation mixing and allows for a very controlled placement of wells.

GZA proposes to use a track-mounted sonic drill rig collecting soil continuously from either five-foot long or 10-foot long cores. Samples will be extruded from the core barrel into polyethylene sleeves. Once the plastic sleeve is cut open, soil will be screened using a PID to detect possible organic vapors. Organic vapor screening will be performed by making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.) Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however, this decision will be field-based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Clean metal/disposable instruments will be used to transfer samples. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for analysis. Once the sample containers



are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4°C.

#### **4.5. Temporary Well Point Installation and Sampling**

If proposed for site characterization, temporary well points will be immediately installed in drilled soil direct-push soil borings by placing a one-inch diameter PVC screen and riser pipe directly into the borehole. No additional materials will be placed around the annular space. The screen will be set so as to straddle the water table. Temporary wells will not be purged prior to sample collection. Depth to water will be measured in each well point to provide data to approximate groundwater flow direction.

Groundwater samples will be collected from the temporary well point using a dedicated microbailer. The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. Samples for dissolved metals will be collected in unpreserved containers and will be filtered and preserved at the laboratory within 24 hours of sampling. Samples will be transported to a NYSDOH ELAP certified laboratory under proper chain of custody procedures for analysis.

Screen and riser pipes will be removed from the borehole and the borehole will be backfilled.

#### **4.6. Permanent Well Installation and Sampling**

Groundwater sampling of permanent monitoring wells is described according to the following distinct phases of this work: well installation/construction, well development, well purging, and well sampling.

##### **4.6.1. *Well Installation/Construction***

To collect representative groundwater samples, soil borings drilled with the sonic drilling method will be converted into permanent two-inch diameter monitoring wells. Groundwater monitoring wells will be constructed of threaded two-inch diameter PVC well casing and 20-slot well screen (to investigate the potential of floating product). The 10-foot screen will be set seven feet below the measured water table. Clean silica sand, Morie No. 1 or equivalent, will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. Solid PVC riser, attached to the well screen, will extend to grade or above if the well is a stick-up. For a two-inch diameter well, the annular space for the filter pack should be 4 inches thick. A two-foot thick bentonite seal will then be placed above the sand pack and moistened with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, filling will be completed using a tremie pipe placed below the surface of the grout. A stick-up or flush-mount protective casing with a locking well cap will then be installed, and a measuring point marked on each PVC well riser. Well construction diagrams will be prepared for each well.





#### 4.6.2. Well Development

Following installation, the groundwater monitoring wells will be developed using a two-inch diameter submersible pump(s) (or equivalent) until the water is reasonably free of turbidity and field readings (pH, conductivity, temperature, and dissolved oxygen) sufficiently stabilize. Fifty nephelometric turbidity units (NTUs) or less will be the turbidity goal but not an absolute value. The wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for seven days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the logbook.

#### 4.6.3. Well Purging

The objective is to purge monitoring wells until turbidity stabilizes to a level as low as possible and this parameter will be given the greatest weight in determining when groundwater sampling may begin. With this objective in mind, a low-flow pump will be used to avoid entrainment of particulates within the well or from the formation. Groundwater from each well will be purged until parameters have stabilized. A turbidity level of fifty NTUs or less is the well purging goal, but not an absolute value before sampling. Other field parameters including temperature, conductivity, pH, and dissolved oxygen (DO) will also be monitored. As practical, all field measurements will be taken from the flow cell and will be recorded during and after purging, and before sampling. Field parameters should generally be within  $\pm 10$  percent for three consecutive readings, one minute apart, prior to sampling.

Upon opening each monitoring well and point, the concentration of VOCs in the headspace will be measured using a PID and water level measurements will be recorded using an electronic interface probe. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings. Water level and free product measurements will first be made and the volume of water in the well determined. The volume of water in the well will be calculated so that the number of well volumes purged and an estimate of the time required to purge the well can be made. Before sampling, the wells will be purged utilizing a low-flow submersible stainless steel pump using dedicated Teflon® or Teflon®-lined polyethylene tubing connected to a flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, to minimize suspension of particulate matter in the well.

Purging will be done with the pump intake placed at the midpoint of the well screen or the midpoint of the water column (to be determined based on the depth and length of the screen interval) to ensure that all stagnant water in the well is removed, while not stirring up sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully to prevent suspension of bottom sediment and subsequent entrainment onto sampling equipment. Surging will be avoided. Tubing will be replaced between each well. Pumps must be carefully cleaned between wells according to the procedures specified in **Section 4.15**, below. It is anticipated that no more than three well volumes will be purged in order for turbidity to reach a minimum and the other parameters to stabilize. Ideally,





pumping rates will be at a rate so that no drawdown of the groundwater level occurs (i.e., pumping rate is less than recharge rate). During purging, the sampler will actively monitor and track the volume of water purged and the field parameter readings. Data will be recorded in the field logbook. For example, the sampler will record the running total volume purged from each well and note the readings for the corresponding field parameters.

#### *4.6.4. Well Sampling*

Once groundwater conditions have stabilized and groundwater levels have recovered, samples will be collected from the flow cell outlet (connected to the low-flow submersible pump). All non-disposable/non-dedicated (re-usable) sampling equipment will be cleaned according to the procedures specified in **Section 4.15**.

Sampling will be performed with the pump intake at the same location used for purging. Pumping rates for withdrawing the samples will be similar to those followed for well purging.

The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. Samples will be transported to a NYSDOH ELAP certified laboratory under proper chain of custody procedures for analysis. Samples for dissolved metals will be collected in unpreserved containers and will be filtered and preserved at the laboratory within 24 hours of sampling.

#### **4.7. Borehole Abandonment**

Soils extracted during the advancement of the borings will be used to backfill the borings, provided that the borings are not to be used for installation of permanent monitoring wells. However, soils that exhibit “gross” contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or PID readings greater than 100 ppm above background, will be managed in accordance with **Section 9**. In this event, bentonite chips or pellets to within 0.5 feet below ground surface. The ground surface will be restored to a similar condition as the surrounding grade (e.g., topsoil, asphalt, or concrete).

#### **4.8. Monitoring Well Abandonment**

There may be occasions when monitoring wells will require abandonment. For temporary monitoring wells, the approach will be to pull the PVC well materials from the borehole and backfill the remaining open portion of the borehole with cement/bentonite grout to approximately 0.5 feet below the ground surface. The ground surface will be restored to a similar condition as the surrounding grade (e.g., topsoil, asphalt, or concrete). For permanent overburden and bedrock monitoring wells, depending on the site-specific subsurface geologic conditions and nature of contamination, the abandonment approach will be in accordance with NYSDEC Policy CP-43 – Groundwater Monitoring Well Decommissioning Policy.



#### **4.9. Soil Reuse and Worker Health & Safety Sampling**

Soil reuse sampling may be performed to determine whether the soil can be reused elsewhere on the Site, or to determine whether contaminant levels in the soil would warrant OSHA 40-hour HAZWOPER training for workers disturbing the soil during post-remediation construction activities. This sampling would consist of compositing discrete soil samples from borings advanced by direct push (see **Section 4.3**), or during test pits following the procedures outlined in **Section 4.2**.

#### **4.10. Waste Characterization Sampling**

Waste classification sampling may be conducted to characterize soil, liquids and/or groundwater for the purpose of proper off-site waste disposal. Specific methods for sampling liquid and solid wastes are briefly discussed below.

##### *4.10.1. Solid Waste*

Solid sampling methods include utilizing dedicated stainless steel or Teflon® scoops/shovels, triers, and thieves. Scoops and shovels are the preferred method for sampling solids from piles or containers. Stainless steel triers are similar to a scoop and are used for the collection of a core sample of a solid material.

##### *4.10.2. Liquid Waste*

Liquid sampling methods include utilizing dedicated dippers, glass tube samplers, pump and tubing, kemmerer bottles, and Bacon Bomb samplers. Dippers are used to collect samples from the surface of the liquid and are appropriate for wastes that are homogeneous. Glass tube samplers consist of glass tubes of varying length and diameter used to collect a full-depth liquid sample from a drum or similar container. Pump and tubing (e.g., bladder pump or peristaltic pump) are used to collect liquid samples from a depth (up to approximately 20 feet below grade), and are typically relied upon for sampling subsurface structures, such as underground storage tanks. To minimize the loss of volatile organic components in the liquid, the lowest achievable flow rate is utilized for collecting the sample by this method. Kemmerer bottles and Bacon Bomb samplers are discrete-depth samplers. These samplers are lowered into the liquid and opened to collect a sample at a desired depth.



#### 4.10.3. *Grab versus Composite Sampling*

Waste characterization of a liquid or a solid can involve grab or composite sampling depending upon the homogeneity and the volume of the waste. Grab sampling consists of collecting a discrete sample or samples of a material and submitting each sample for separate analysis. Grab sampling is appropriate for characterizing small quantities of waste as well as waste streams of varying content (e.g., drums of different contents). Composite sampling consists of taking discrete grab samples of a material and combining them into a smaller number of samples for analysis. Composite sampling generally is appropriate for large volumes of a homogenous waste material, such as a pile of soil or construction debris. The specific number of composite and grab samples largely will depend upon the size and nature of the waste pile (i.e., cubic yards) as well as the analysis required for characterization of the waste.

#### 4.11. **Soil Gas Sampling**

A direct-push drill rig will be utilized to drive rods with a decontaminated stainless steel probe to the desired sample depth, which will be a minimum of 5 feet bgs or two feet above the water table if groundwater is present at 5 feet. The soil gas probe will then be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three volumes using a photoionization detector (PID) with an integrated vacuum pump (MiniRAE 3000 or appropriate alternate). Peak and stabilized PID readings will be recorded prior to sample collection. Following the stabilization period, each probe will be connected to an evacuated laboratory-supplied 6-liter SUMMA<sup>®</sup> canister. SUMMA<sup>®</sup> canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. After connecting the SUMMA<sup>®</sup> canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of 20 minutes. The samples will not be drawn at greater than 0.2 liters per minute. Quantitation limits for all analytes range between 1.6 ppbV and 4.0 ppbV, depending on the compound. After collecting the soil gas sample, the valve will be closed and disconnected from the soil gas probe. The soil-gas samples will be transported to a NYSDOH ELAP certified laboratory for TO-15 analysis.

Prior to sample collection, helium will be used as a tracer gas to evaluate the potential for infiltration of outdoor air into the sample. Subsequent rounds of soil gas sampling would include the use of tracer gas only if the initial round of sampling indicates that outdoor air has the potential to influence soil gas sample results.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);



- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

#### **4.12. Ambient Air Sampling**

Ambient air samples will be collected with an evacuated laboratory-supplied 6-liter SUMMA<sup>®</sup> canister. SUMMA<sup>®</sup> canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. The sample will be set at an elevation of approximately 4 to 5 feet above grade, to represent breathing zone air quality conditions. The samples will not be drawn at greater than 0.2 liters per minute. After collecting the ambient air sample, the valve will be closed, and the canister will be labeled with the necessary information. The soil-gas samples will be transported to a NYSDOH ELAP certified laboratory for TO-15 analysis.

When ambient air samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

#### **4.13. QC Sample Collection**

QC samples will include equipment blanks, trip blanks, field duplicates and MS/MSDs.

**Equipment blanks** will consist of distilled water and will be used to check for potential contamination of the equipment that may cause sample contamination. Equipment blanks will be collected by routing the distilled water through the sampling equipment prior to sample collection. Equipment blanks will be submitted to the laboratory at a frequency of one per day per matrix per type of equipment being used per parameter. Equipment blanks will not be collected with samples for analysis for TCLP parameters, parameters associated with wastewater samples, samples collected for disposal purposes, soil gas samples, chip samples, wipe samples and samples collected for grain size analyses.

**Trip blanks** will consist of distilled water (supplied by the laboratory) and will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant



migration during sample shipment and storage. Trip blanks will be transported to the site unopened, stored with the investigative samples, and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler that contains groundwater samples for analysis for VOCs.

**Field duplicates** are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 samples for all matrices and all parameters with the exception of TCLP parameters, parameters associated with wastewater samples, samples collected for waste characterization purposes, chip samples, wipe samples and samples collected for grain size analyses. Soil gas field duplicates will be obtained by using a tubing a T-splitter.

**MSs and MSDs** are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs will be submitted at a frequency of one per 20 investigative samples per matrix for organic parameters for soil, sediment, and groundwater. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

#### **4.14. Sample Preservation and Containerization**

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to EPA specifications. The containers will be pre-preserved, where appropriate (see **Table 2**).

**Table 6** presents a summary of QC sample preservation and container requirements.

#### **4.15. Equipment Decontamination**

Re-usable Teflon<sup>®</sup>, stainless steel, and aluminum sampling equipment shall be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture
- Tap water rinse
- Distilled/deionized water rinse



- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with distilled/deionized water.

## 5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

### 5.1. Sample Collection Documentation

#### 5.1.1. *Field Notes*

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the remediation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook should contain the following:

- Person to whom the logbook is assigned
- The logbook number
- Project name and number
- Site name and location
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark that is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook should include, but may not be limited to, the following:

- Chronology of activities, including entry and exit times
- Names of all people involved in sampling activities
- Level of personal protection used



- Any changes made to planned protocol
- Names of visitors to the site during sampling and reason for their visit
- Sample location and identification
- Changes in weather conditions
- Dates (month/day/year) and times (military) of sample collection
- Measurement equipment identification (model/manufacturer) and calibration information
- Sample collection methods and equipment
- Sample depths
- Whether grab or composite sample collected
- How sample composited, if applicable
- Sample description (color, odor, texture, etc.)
- Sample identification code
- Tests or analyses to be performed
- Sample preservation and storage conditions
- Equipment decontamination procedures
- QC sample collection
- Unusual observations
- Record of photographs
- Sketches or diagrams
- Signature of person recording the information

Field logbooks will be reviewed on a daily basis by the Field Team Leader. Logbooks will be supported by standardized forms.

#### *5.1.2. Chain-of-Custody Records*

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratories, via third-party commercial carriers or via laboratory courier service.

Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in **Section 5.2.2** of this Plan.

#### *5.1.3. Sample Labeling*

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier.





- A. The following identification scheme will be used:

**Soil borings** will be assigned sequential numbers. For soil samples collected from soil borings, sample numbers will be assigned as follows:

GZ-#(sampling interval)

**Example:**

Sample GZ-4(4-6') = soil sample collected from soil boring #4 at a depth of 5-6' below grade.

**Groundwater wells** will be assigned sequential numbers. Groundwater samples will be identified by the well that the sample was collected from.

**Examples:**

GMW-01 = groundwater sample collected from permanent well point #1

**Sub-slab soil vapor/soil vapor/ambient air** will be assigned numbers coordinating with the adjacent soil boring or a sequential number due to sample names being identical to a previous Site sampling event. Vapor samples will be identified by the soil gas point that the sample was collected from.

**Examples:**

GSV-01 = Soil vapor sample collected from the soil gas point

OA-01 = Outdoor ambient air sample

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g., Equipment Blank, Soil

MS/MSDs will be noted in the Comments column of the COC.

- B. The analysis required will be indicated for each sample.

**Example:** SVOC

- C. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

**Example:** 04-22-22

- D. Time will be the time the sample was collected, using military time.

**Example:** 14:30



- E. The sampler's name will be printed in the "Sampled By" section.
- F. Other information relevant to the sample.

Example: Equipment Blank

An example sample label is presented below:

Job No: XXXXXXXXX  
Client: Name  
Sample No: GZ-01(5-5.5')  
Matrix: Soil  
Date Taken: 5/22/24  
Time Taken: 14:30  
Sampler: B. Smith  
Analysis: SVOC

Job No. \_\_\_\_\_  
Client: \_\_\_\_\_  
Sample Number \_\_\_\_\_  
Date \_\_\_\_\_ Sample Time \_\_\_\_\_  
Sample Matrix \_\_\_\_\_  
Grab or Composite (explain) \_\_\_\_\_  
Preservatives \_\_\_\_\_  
Analyses \_\_\_\_\_  
Sampler Signature \_\_\_\_\_

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the QEP.

## 5.2. Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if

- the item is in the actual possession of a person



- the item is in the view of the person after being in actual possession of the person
- the item was in the actual physical possession of the person but is locked up to prevent tampering
- the item is in a designated and identified secure area

#### 5.2.1. Field Custody Procedures

Samples will be collected following the sampling procedures documented in **Section 4.0** of this Plan. Documentation of sample collection is described in **Section 5.1** of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures are intended to ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.
- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.
- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.
- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.
- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. If third party commercial carriers are used for transfer to the laboratory, shipping containers will be secured with strapping tape and custody seals prior to shipment. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.
- If the samples are sent by third party commercial carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off



on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory courier or sample custodian, and signature of the laboratory courier or sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

#### *5.2.2. Laboratory Custody Procedures*

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,
- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on chain-of-custody forms,
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the QEP,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

## **6.0 CALIBRATION PROCEDURES**

### **6.1. Field Instruments**

Field instruments will be calibrated according to the manufacturer's specifications. Calibration procedures performed will be documented in the field logbook and will include the date/time of



calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

## **6.2. Laboratory Instruments**

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in **Table 2** of this Plan). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

## **7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES**

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, the responsible contractor will prepare an addendum establishing the field analytical procedures. Analyses of all samples will be performed by NYSDOH ELAP certified laboratories. **Table 2** summarizes the analytical methods to be used during the remediation.

## **8.0 DATA REDUCTION, VALIDATION, AND REPORTING**

Appropriate QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation will be provided by the analytical laboratory.

For all analyses, the laboratory will report results that are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by the sampler on an as-needed basis. A Data Usability Summary Report (DUSR) will be prepared and will be included in the Remedial Investigation Report (RIR). Qualifications of the DUSR preparer can be found in **Attachment A**.

### **8.1. Data Evaluation/Validation**

#### **8.1.1. *Field Data Evaluation***

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by



the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

#### *8.1.2. Data Usability*

A Data Usability Summary Report (DUSR) will be prepared in accordance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

The data usability evaluation will include reviewing the quality assurance/quality control (QA/QC) information including: (1) chain-of-custody; (2) the summary QA/QC information provided by the laboratory; and (3) the project narrative.

For each data package the following questions will be evaluated:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B, USEPA CLP deliverables or other standards/guidance?
- Have all holding times and preservation requirements been met?
- Do the quality control (QC) data fall within the laboratory and project established limits and specifications?

#### **8.2. Identification and Treatment of Outliers**

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one-tailed t-test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.



Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

## 9.0 INTERNAL QUALITY CONTROL

The subcontracting laboratories' Quality Assurance Project Plans will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Quantitation limit determination and confirmation by analysis of low-level calibration standard

As outline on **Table 5** and summarized in **Section 4.13**, field quality control samples will include:

- Equipment blanks
- Field duplicate samples
- Trip blanks
- MS/MSDs

## 10.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of the QEP. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the Program Manager. The corrective action will usually involve recalculation, reanalysis, or resampling.





### **10.1. Immediate Corrective Action**

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The Field Team Leader will approve the corrective action and notify the Program Manager. The Program Manager will approve the corrective measure. The Field Team Leader will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the QEP will be notified. The QEP will notify the Program Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the Program Manager. If the corrective action does not rectify the situation,



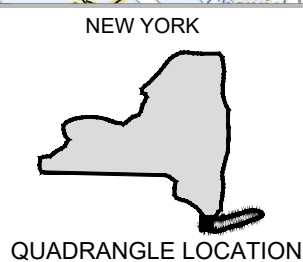
the laboratory will contact the Program Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action, if necessary.



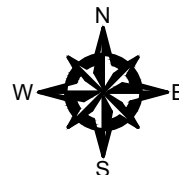
June 2024  
File No. 41.0163263.00  
QAPP/FSP – 55 Eckford Street, Brooklyn, NY

## FIGURES



**SOURCE:**

USGS TOPOGRAPHIC MAPS: BROOKLYN, NY, NJ (2023).  
CONTOUR INTERVAL 10FT., NAVD-1988, ORIGINAL SCALE  
1:24,000 (1IN.=2,000FT.).



UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

|                                                                                            |  |                                                                                                                                                                                                       |                              |                                                          |                  |
|--------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------|------------------|
| NYSDEC BCP SITE NO. C224390<br>19-27 CLAY ST AND 60-62 COMMERCIAL ST<br>BROOKLYN, NY 11222 |  | <div>PREPARED BY:</div> <div> <b>GZA</b> GeoEnvironmental of NY<br/>Engineers and Scientists<br/>www.gza.com</div> |                              | <div>PREPARED FOR:</div> <div>CLAY PROPERTIES, LLC</div> |                  |
| SITE LOCATION MAP                                                                          |  | PROJ MGR: MH                                                                                                                                                                                          | REVIEWED BY: MH              | CHECKED BY: VW                                           | FIGURE<br><br>1  |
|                                                                                            |  | DESIGNED BY: SG                                                                                                                                                                                       | DRAWN BY: SG                 | SCALE: 1"=2000'                                          |                  |
|                                                                                            |  | DATE:<br>JUNE 2024                                                                                                                                                                                    | PROJECT NO.<br>41.0163279.00 | REVISION NO.<br>-                                        |                  |
|                                                                                            |  |                                                                                                                                                                                                       |                              |                                                          | SHEET NO. 1 OF 1 |



June 2024  
File No. 41.0163263.00  
QAPP/FSP – 55 Eckford Street, Brooklyn, NY

## TABLES

**Table 1 A**  
**Soil Criteria Table**

**19 Clay Street and 60-62 Commercial Street**  
**Brooklyn, New York**  
**BCP Site No. C224390**  
**QAPP/FSP**

| Contaminant                                                                                           | Protection of Public Health |                    |                        |                     |                     | Protection of Ecological Resources <sup>n</sup> | Protection of Groundwater |
|-------------------------------------------------------------------------------------------------------|-----------------------------|--------------------|------------------------|---------------------|---------------------|-------------------------------------------------|---------------------------|
|                                                                                                       | Unrestricted Use            | Residential        | Restricted-Residential | Commercial          | Industrial          |                                                 |                           |
| All soil cleanup objectives (SCOs) are in parts per million (ppm); approximately equivalent to mg/kg. |                             |                    |                        |                     |                     |                                                 |                           |
| Metals                                                                                                |                             |                    |                        |                     |                     |                                                 |                           |
| Arsenic                                                                                               | 13 <sup>m</sup>             | 16 <sup>f</sup>    | 17 <sup>f</sup>        | 18 <sup>f</sup>     | 19 <sup>f</sup>     | 13 <sup>f</sup>                                 | 16 <sup>f</sup>           |
| Barium                                                                                                | 350 <sup>m</sup>            | 350 <sup>f</sup>   | 400                    | 400                 | 10,000 <sup>d</sup> | 433                                             | 820                       |
| Beryllium                                                                                             | 7.2                         | 14                 | 72                     | 590                 | 2,700               | 10                                              | 47                        |
| Cadmium                                                                                               | 2.5 <sup>m</sup>            | 2.5 <sup>f</sup>   | 4.3                    | 9.3                 | 60                  | 4                                               | 7.5                       |
| Chromium, hexavalent <sup>h</sup>                                                                     | 1 <sup>i</sup>              | 22                 | 110                    | 400                 | 800                 | 1 <sup>e</sup>                                  | 19                        |
| Chromium, trivalent <sup>h</sup>                                                                      | 30 <sup>m</sup>             | 36                 | 180                    | 1,500               | 6,800               | 41                                              | NS                        |
| Copper                                                                                                | 50                          | 270                | 270                    | 270                 | 10,000 <sup>d</sup> | 50                                              | 1,720                     |
| Total Cyanide <sup>h</sup>                                                                            | 27                          | 27                 | 27                     | 27                  | 10,000 <sup>d</sup> | NS                                              | 40                        |
| Lead                                                                                                  | 63 <sup>m</sup>             | 400                | 400                    | 1,000               | 3,900               | 63 <sup>f</sup>                                 | 450                       |
| Manganese                                                                                             | 1600 <sup>m</sup>           | 2,000 <sup>f</sup> | 2,000 <sup>f</sup>     | 10,000 <sup>d</sup> | 10,000 <sup>d</sup> | 1600 <sup>f</sup>                               | 2,000 <sup>f</sup>        |
| Total Mercury                                                                                         | 0.18 <sup>m</sup>           | 0.81 <sup>j</sup>  | 0.81 <sup>j</sup>      | 2.8 <sup>j</sup>    | 5.7 <sup>j</sup>    | 0.18 <sup>f</sup>                               | 0.73                      |
| Nickel                                                                                                | 30                          | 140                | 310                    | 310                 | 10,000 <sup>d</sup> | 30                                              | 130                       |
| Selenium                                                                                              | 3.9 <sup>m</sup>            | 36                 | 180                    | 1,500               | 6,800               | 3.9 <sup>f</sup>                                | 4 <sup>f</sup>            |
| Silver                                                                                                | 2                           | 36                 | 180                    | 1,500               | 6,800               | 2                                               | 8.3                       |
| Zinc                                                                                                  | 109 <sup>m</sup>            | 2200               | 10,000 <sup>d</sup>    | 10,000 <sup>d</sup> | 10,000 <sup>d</sup> | 109 <sup>f</sup>                                | 2,480                     |
| PCBs/Pesticides                                                                                       |                             |                    |                        |                     |                     |                                                 |                           |
| 2,4,5-TP Acid (Silvex)                                                                                | 3.8                         | 58                 | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 3.8                       |
| 4,4'-DDE                                                                                              | 0.0033 <sup>i</sup>         | 1.8                | 8.9                    | 62                  | 120                 | 0.0033 <sup>e</sup>                             | 17                        |
| 4,4'-DDT                                                                                              | 0.0033 <sup>i</sup>         | 1.7                | 7.9                    | 47                  | 94                  | 0.0033 <sup>e</sup>                             | 136                       |
| 4,4'-DDD                                                                                              | 0.0033 <sup>i</sup>         | 2.6                | 13                     | 92                  | 180                 | 0.0033 <sup>e</sup>                             | 14                        |
| Aldrin                                                                                                | 0.005 <sup>m</sup>          | 0.019              | 0.097                  | 0.68                | 1.4                 | 0.14                                            | 0.19                      |
| alpha-BHC                                                                                             | 0.02                        | 0.097              | 0.48                   | 3.4                 | 6.8                 | 0.04 <sup>e</sup>                               | 0.02                      |
| beta-BHC                                                                                              | 0.036                       | 0.072              | 0.36                   | 3                   | 14                  | 0.6                                             | 0.09                      |
| Chlordane (alpha)                                                                                     | 0.094                       | 0.91               | 4.2                    | 24                  | 47                  | 1.3                                             | 2.9                       |
| delta-BHC                                                                                             | 0.04                        | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | 0.04 <sup>e</sup>                               | 0.25                      |
| Dibenzofuran                                                                                          | 7                           | 14                 | 59                     | 350                 | 1,000 <sup>c</sup>  | NS                                              | 210                       |
| Dieldrin                                                                                              | 0.005 <sup>m</sup>          | 0.039              | 0.2                    | 1.4                 | 2.8                 | 0.006                                           | 0.1                       |
| Endosulfan I                                                                                          | 2.4                         | 4.8 <sup>i</sup>   | 24 <sup>i</sup>        | 200 <sup>i</sup>    | 920 <sup>i</sup>    | NS                                              | 102                       |
| Endosulfan II                                                                                         | 2.4                         | 4.8 <sup>i</sup>   | 24 <sup>i</sup>        | 200 <sup>i</sup>    | 920 <sup>i</sup>    | NS                                              | 102                       |
| Endosulfan sulfate                                                                                    | 2.4                         | 4.8 <sup>i</sup>   | 24 <sup>i</sup>        | 200 <sup>i</sup>    | 920 <sup>i</sup>    | NS                                              | 1,000 <sup>c</sup>        |
| Endrin                                                                                                | 0.014                       | 2.2                | 11                     | 89                  | 410                 | 0.014                                           | 0.06                      |
| Heptachlor                                                                                            | 0.042                       | 0.42               | 2.1                    | 15                  | 29                  | 0.14                                            | 0.38                      |
| Lindane                                                                                               | 0.1                         | 0.28               | 1.3                    | 9.2                 | 23                  | 6                                               | 0.1                       |
| Polychlorinated biphenyls                                                                             | 0.1                         | 1                  | 1                      | 1                   | 25                  | 1                                               | 3.2                       |
| Semivolatiles                                                                                         |                             |                    |                        |                     |                     |                                                 |                           |
| Acenaphthene                                                                                          | 20                          | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | 20                                              | 98                        |
| Acenaphthylene                                                                                        | 100 <sup>k</sup>            | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 501 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 107                       |
| Anthracene                                                                                            | 100 <sup>k</sup>            | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 502 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 1,000 <sup>c</sup>        |
| Benz(a)anthracene                                                                                     | 1 <sup>m</sup>              | 1 <sup>f</sup>     | 1 <sup>f</sup>         | 5.6                 | 11                  | NS                                              | 1 <sup>f</sup>            |
| Benzo(a)pyrene                                                                                        | 1 <sup>m</sup>              | 1 <sup>f</sup>     | 1 <sup>f</sup>         | 1 <sup>f</sup>      | 1.1                 | 2.6                                             | 22                        |
| Benzo(b)fluoranthene                                                                                  | 1 <sup>m</sup>              | 1 <sup>f</sup>     | 1 <sup>f</sup>         | 5.6                 | 11                  | NS                                              | 1.7                       |
| Benzo(g,h,i)perylene                                                                                  | 100                         | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 1,000 <sup>c</sup>        |
| Benzo(k)fluoranthene                                                                                  | 0.8 <sup>m</sup>            | 1                  | 3.9                    | 56                  | 110                 | NS                                              | 1.7                       |
| Chrysene                                                                                              | 1 <sup>m</sup>              | 1 <sup>f</sup>     | 3.9                    | 56                  | 110                 | NS                                              | 1 <sup>f</sup>            |
| Dibenz(a,h)anthracene                                                                                 | 0.33 <sup>i</sup>           | 0.33 <sup>e</sup>  | 0.33 <sup>e</sup>      | 0.56                | 1.1                 | NS                                              | 1,000 <sup>c</sup>        |
| Fluoranthene                                                                                          | 100 <sup>k</sup>            | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 1,000 <sup>c</sup>        |
| Fluorene                                                                                              | 30                          | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | 30                                              | 386                       |
| Indeno(1,2,3-cd)pyrene                                                                                | 0.5 <sup>m</sup>            | 0.5 <sup>f</sup>   | 0.5 <sup>f</sup>       | 5.6                 | 11                  | NS                                              | 8.2                       |
| m-Cresol                                                                                              | 0.33 <sup>i</sup>           | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 0.33 <sup>e</sup>         |
| Naphthalene                                                                                           | 12                          | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 12                        |
| o-Cresol                                                                                              | 0.33 <sup>i</sup>           | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 0.33 <sup>e</sup>         |
| p-Cresol                                                                                              | 0.33 <sup>i</sup>           | 34                 | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 0.33 <sup>e</sup>         |
| Pentachlorophenol                                                                                     | 0.8 <sup>i</sup>            | 2.4                | 6.7                    | 6.7                 | 55                  | 0.8 <sup>e</sup>                                | 0.8 <sup>e</sup>          |
| Phenanthrene                                                                                          | 100                         | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 1,000 <sup>c</sup>        |
| Phenol                                                                                                | 0.33 <sup>i</sup>           | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | 30                                              | 0.33 <sup>e</sup>         |
| Pyrene                                                                                                | 100                         | 100 <sup>a</sup>   | 100 <sup>a</sup>       | 500 <sup>b</sup>    | 1,000 <sup>c</sup>  | NS                                              | 1,000 <sup>c</sup>        |



**Table 1 A**  
**Soil Criteria Table**

**19 Clay Street and 60-62 Commervial Street**  
**Brooklyn, New York**  
**BCP Site No. C224390**  
**QAPP/FSP**

| Contaminant                                                                                                                                                                                                                                                                                                        | Protection of Public Health |                   |                        |                  |                    | Protection of Ecological Resources <sup>n</sup> | Protection of Groundwater |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------|------------------------|------------------|--------------------|-------------------------------------------------|---------------------------|
|                                                                                                                                                                                                                                                                                                                    | Unrestricted Use            | Residential       | Restricted-Residential | Commercial       | Industrial         |                                                 |                           |
| All soil cleanup objectives (SCOs) are in parts per million (ppm); approximately equivalent to mg/kg.                                                                                                                                                                                                              |                             |                   |                        |                  |                    |                                                 |                           |
| Volatiles                                                                                                                                                                                                                                                                                                          |                             |                   |                        |                  |                    |                                                 |                           |
| 1,1,1-Trichloroethane                                                                                                                                                                                                                                                                                              | 0.68                        | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 0.68                      |
| 1,1-Dichloroethane                                                                                                                                                                                                                                                                                                 | 0.27                        | 19                | 26                     | 240              | 480                | NS                                              | 0.27                      |
| 1,1-Dichloroethene                                                                                                                                                                                                                                                                                                 | 0.33                        | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 0.33                      |
| 1,2-Dichlorobenzene                                                                                                                                                                                                                                                                                                | 1.1                         | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 1.1                       |
| 1,2-Dichloroethane                                                                                                                                                                                                                                                                                                 | 0.02 <sup>m</sup>           | 2.3               | 3.1                    | 30               | 60                 | 10                                              | 0.02 <sup>f</sup>         |
| cis-1,2-Dichloroethene                                                                                                                                                                                                                                                                                             | 0.25                        | 59                | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 0.25                      |
| trans-1,2-Dichloroethene                                                                                                                                                                                                                                                                                           | 0.19                        | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 0.19                      |
| 1,3-Dichlorobenzene                                                                                                                                                                                                                                                                                                | 2.4                         | 17                | 49                     | 280              | 560                | NS                                              | 2.4                       |
| 1,4-Dichlorobenzene                                                                                                                                                                                                                                                                                                | 1.8                         | 9.8               | 13                     | 130              | 250                | 20                                              | 1.8                       |
| 1,4-Dioxane                                                                                                                                                                                                                                                                                                        | 0.1 <sup>i</sup>            | 9.8               | 13                     | 130              | 250                | 0.1 <sup>e</sup>                                | 0.1 <sup>e</sup>          |
| Acetone                                                                                                                                                                                                                                                                                                            | 0.05                        | 100 <sup>a</sup>  | 100 <sup>b</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | 2.2                                             | 0.05                      |
| Benzene                                                                                                                                                                                                                                                                                                            | 0.06                        | 2.9               | 4.8                    | 44               | 89                 | 70                                              | 0.06                      |
| Butylbenzene                                                                                                                                                                                                                                                                                                       | 12                          | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 12                        |
| Carbon tetrachloride                                                                                                                                                                                                                                                                                               | 0.76                        | 1.4               | 2.4                    | 22               | 44                 | NS                                              | 0.76                      |
| Chlorobenzene                                                                                                                                                                                                                                                                                                      | 1.1                         | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | 40                                              | 1.1                       |
| Chloroform                                                                                                                                                                                                                                                                                                         | 0.37                        | 10                | 49                     | 350              | 700                | 12                                              | 0.37                      |
| Ethylbenzene                                                                                                                                                                                                                                                                                                       | 1                           | 30                | 41                     | 390              | 780                | NS                                              | 1                         |
| Hexachlorobenzene                                                                                                                                                                                                                                                                                                  | 0.33 <sup>i</sup>           | 0.33 <sup>e</sup> | 1.2                    | 6                | 12                 | NS                                              | 3.2                       |
| Methyl ethyl ketone                                                                                                                                                                                                                                                                                                | 0.12                        | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | 100 <sup>a</sup>                                | 0.12                      |
| Methyl tert-butyl ether                                                                                                                                                                                                                                                                                            | 0.93                        | 62                | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 0.93                      |
| Methylene chloride                                                                                                                                                                                                                                                                                                 | 0.05                        | 51                | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | 12                                              | 0.05                      |
| n-Propylbenzene                                                                                                                                                                                                                                                                                                    | 3.9                         | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 3.9                       |
| sec-Butylbenzene                                                                                                                                                                                                                                                                                                   | 11                          | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 11                        |
| tert-Butylbenzene                                                                                                                                                                                                                                                                                                  | 5.9                         | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | NS                                              | 5.9                       |
| Tetrachloroethene                                                                                                                                                                                                                                                                                                  | 1.3                         | 5.5               | 19                     | 150              | 300                | 2                                               | 1.3                       |
| Toluene                                                                                                                                                                                                                                                                                                            | 0.7                         | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | 36                                              | 0.7                       |
| Trichloroethene                                                                                                                                                                                                                                                                                                    | 0.47                        | 10                | 21                     | 200              | 400                | 2                                               | 0.47                      |
| 1,2,4-Trimethylbenzene                                                                                                                                                                                                                                                                                             | 3.6                         | 47                | 52                     | 190              | 380                | NS                                              | 3.6                       |
| 1,3,5-Trimethylbenzene                                                                                                                                                                                                                                                                                             | 8.4                         | 47                | 52                     | 190              | 380                | NS                                              | 8.4                       |
| Vinyl chloride                                                                                                                                                                                                                                                                                                     | 0.02                        | 0.21              | 0.9                    | 13               | 27                 | NS                                              | 0.02                      |
| Xylene (mixed)                                                                                                                                                                                                                                                                                                     | 0.26                        | 100 <sup>a</sup>  | 100 <sup>a</sup>       | 500 <sup>b</sup> | 1,000 <sup>c</sup> | 0.26                                            | 1.6                       |
| Per-and Polyfluoroalkyl Substances (PFAs) <sup>o</sup>                                                                                                                                                                                                                                                             |                             |                   |                        |                  |                    |                                                 |                           |
| PFOA                                                                                                                                                                                                                                                                                                               | 0.00066                     | 0.0066            | 0.033                  | 0.5              | 0.6                | NS                                              | 0.0011                    |
| PFOS                                                                                                                                                                                                                                                                                                               | 0.00088                     | 0.0088            | 0.044                  | 0.44             | 0.44               | NS                                              | 0.0037                    |
| Notes:                                                                                                                                                                                                                                                                                                             |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>a</sup> The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.                                                                                                                                                                              |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>b</sup> The SCOs for commercial use were capped at a maximum value of 500 ppm.                                                                                                                                                                                                                                |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>c</sup> The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm.                                                                                                                                                                                             |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>d</sup> The SCOs for metals were capped at a maximum value of 10,000 ppm.                                                                                                                                                                                                                                     |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>e</sup> For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.                                                                                                                                                          |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>f</sup> For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.                       |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>g</sup> This SCO is derived from data on mixed isomers of BHC.                                                                                                                                                                                                                                                |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>h</sup> The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.                                                                                                                              |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>i</sup> This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.                                                                                                                                                                                                                       |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>j</sup> This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).                                                                                                                                                                                                             |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>k</sup> The SCOs for unrestricted use were capped at a maximum value of 100 ppm.                                                                                                                                                                                                                              |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>l</sup> For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.                                                                                                                                                  |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>m</sup> For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.                      |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>n</sup> Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD. |                             |                   |                        |                  |                    |                                                 |                           |
| <sup>o</sup> SCOs for PFAs are taken from the NYSDEC Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs, dated April 2023.                                                                                                                  |                             |                   |                        |                  |                    |                                                 |                           |



**Table 1B**  
Groundwater Criteria Table  
19 Clay Street and 60-62 Commercial Street  
Brooklyn, New York  
BCP Site No. C224390

| Contaminant            | Aqueous Water Quality Standards <sup>1</sup> , ug/L |
|------------------------|-----------------------------------------------------|
| <b>Metals</b>          |                                                     |
| Antimony               | 3                                                   |
| Arsenic                | ---                                                 |
| Arsenic                | 25                                                  |
| Barium                 | 1,000                                               |
| Beryllium              | 3                                                   |
| Cadmium                | 5                                                   |
| Chromium, hexavalent   | ---                                                 |
| Chromium, trivalent    | 50                                                  |
| Copper                 | 200                                                 |
| Cyanide                | ---                                                 |
| Iron                   | 300                                                 |
| Lead                   | 25                                                  |
| Magnesium              | 35,000                                              |
| Manganese              | 300                                                 |
| Mercury                | 0.7                                                 |
| Nickel                 | 100                                                 |
| Selenium               | 10                                                  |
| Silver                 | 50                                                  |
| Sodium                 | 20,000                                              |
| Thallium               | 0.5                                                 |
| Zinc                   | 2000                                                |
| <b>PCBs/Pesticides</b> |                                                     |
| alpha-BHC              | 0.01                                                |
| 2,4,5-TP Acid (Silvex) | ---                                                 |
| 4,4'-DDD               | 0.3                                                 |
| 4,4'-DDE               | 0.2                                                 |
| 4,4'-DDT               | 0.2                                                 |
| Aldrin                 | ---                                                 |
| beta-BHC               | 0.04                                                |
| Chlordane (alpha)      | ---                                                 |
| Dibenzofuran           | ---                                                 |
| Dieldrin               | 0.004                                               |
| Endosulfan I           | 0.12                                                |
| Endosulfan II          | 0.12                                                |
| Endosulfan sulfate     | 0.12                                                |
| Endrin                 | ---                                                 |
| Endrin aldehyde        | 5                                                   |
| Endrin ketone          | 5                                                   |
| gamma-BHC (Lindane)    | 0.05                                                |

**Table 1B**  
Groundwater Criteria Table  
19 Clay Street and 60-62 Commercial Street  
Brooklyn, New York  
BCP Site No. C224390

| Contaminant                    | Aqueous Water Quality Standards <sup>1</sup> , ug/L |
|--------------------------------|-----------------------------------------------------|
| <b>PCBs/Pesticides, Con't.</b> |                                                     |
| gamma-Chlordane                | 0.12                                                |
| Heptachlor                     | 0.04                                                |
| Heptachlor epoxide             | 0.03                                                |
| Lindane                        | ---                                                 |
| Methoxychlor                   | 35                                                  |
| Polychlorinated biphenyls      | ---                                                 |
| Toxaphene                      | 0.06                                                |
| <b>Semivolatiles</b>           |                                                     |
| 1,1'-Biphenyl                  | 5                                                   |
| 2,2'-oxybis(1-Chloropropane)   | 5                                                   |
| 2,4,5-Trichlorophenol          | 1                                                   |
| 2,4-Dichlorophenol             | 1                                                   |
| 2,4-Dimethylphenol             | 50                                                  |
| 2,4-Dinitrophenol              | 10                                                  |
| 2,4-Dinitrotoluene             | 5                                                   |
| 2,6-Dinitrotoluene             | 5                                                   |
| 2-Chloronaphthalene            | 10                                                  |
| 2-Chlorophenol                 | 1                                                   |
| 2-Methylnaphthalene            | 502                                                 |
| 2-Methylphenol                 | 1                                                   |
| 2-Nitroaniline                 | 5                                                   |
| 2-Nitrophenol                  | 1                                                   |
| 3,3'-Dichlorobenzidine         | 5                                                   |
| 3-Nitroaniline                 | 5                                                   |
| 4-Chloro-3-methylphenol        | 1                                                   |
| 4-Chloroaniline                | 5                                                   |
| 4-Methylphenol                 | 1                                                   |
| 4-Nitroaniline                 | 5                                                   |
| 4-Nitrophenol                  | 1                                                   |
| Acenaphthene                   | 20                                                  |
| Acenaphthylene                 | 202                                                 |
| Anthracene                     | 50                                                  |
| Atrazine                       | 7.5                                                 |
| Benz(a)anthracene              | 0.002                                               |
| Benzo(a)pyrene                 | ---                                                 |
| Benzo(b)fluoranthene           | 0.002                                               |
| Benzo(g,h,i)perylene           | 52                                                  |
| Benzo(k)fluoranthene           | 0.002                                               |
| bis(2-Chloroethoxy)methane     | 5                                                   |

**Table 1B**  
Groundwater Criteria Table  
19 Clay Street and 60-62 Commercial Street  
Brooklyn, New York  
BCP Site No. C224390

| Contaminant                           | Aqueous Water Quality Standards <sup>1</sup> , ug/L |
|---------------------------------------|-----------------------------------------------------|
| <b>Semivolatiles, Con't.</b>          |                                                     |
| Bis(2-Chloroethyl)ether               | 1                                                   |
| bis(2-Ethylhexyl)phthalate            | 5                                                   |
| Butylbenzylphthalate                  | 50                                                  |
| Chrysene                              | 0.002                                               |
| Dibenz(a,h)anthracene                 | 502                                                 |
| Dibenzofuran                          | 52                                                  |
| Diethylphthalate                      | 50                                                  |
| Dimethylphthalate                     | 50                                                  |
| Di-n-butylphthalate                   | 50                                                  |
| Di-n-octylphthalate                   | 50                                                  |
| Fluoranthene                          | 50                                                  |
| Fluorene                              | 50                                                  |
| Hexachlorobenzene                     | 0.04                                                |
| Hexachlorobutadiene                   | 0.5                                                 |
| Hexachlorocyclopentadiene             | 5                                                   |
| Hexachloroethane                      | 5                                                   |
| Indeno(1,2,3-cd)pyrene                | 0.002                                               |
| Isophorone                            | 50                                                  |
| m-Cresol                              | ---                                                 |
| Naphthalene                           | 10                                                  |
| Nitrobenzene                          | 0.4                                                 |
| N-Nitrosodiphenylamine                | 50                                                  |
| o-Cresol                              | ---                                                 |
| p-Cresol                              | ---                                                 |
| Pentachlorophenol                     | 1                                                   |
| Phenanthrene                          | 50                                                  |
| Phenol                                | 1                                                   |
| Pyrene                                | 50                                                  |
| <b>Volatiles</b>                      |                                                     |
| 1,1,1-Trichloroethane                 | 5                                                   |
| 1,1,2,2-Tetrachloroethane             | 5                                                   |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 5                                                   |
| 1,1,2-Trichloroethane                 | 1                                                   |
| 1,1-Dichloroethane                    | 5                                                   |
| 1,1-Dichloroethene                    | 5                                                   |
| 1,1-Dichloroethylene                  | ---                                                 |
| 1,2,4-Trichlorobenzene                | ---                                                 |

**Table 1B**  
Groundwater Criteria Table  
19 Clay Street and 60-62 Commercial Street  
Brooklyn, New York  
BCP Site No. C224390

| Contaminant                 | Aqueous Water Quality Standards <sup>1</sup> , ug/L |
|-----------------------------|-----------------------------------------------------|
| <b>Volatiles, Con't.</b>    |                                                     |
| 1,2,4-Trimethylbenzene      | 5                                                   |
| 1,2-Dibromo-3-chloropropane | 0.04                                                |
| 1,2-Dibromoethane           | 0.0006                                              |
| 1,2-Dichlorobenzene         | 3                                                   |
| 1,2-Dichloroethane          | 0.6                                                 |
| 1,2-Dichloropropane         | 1                                                   |
| 1,3,5- Trimethylbenzene     | ---                                                 |
| 1,3-Butadiene               | ---                                                 |
| 1,3-Dichlorobenzene         | 3                                                   |
| 1,3-Dichlorobenzene         | ---                                                 |
| 1,4-Dichlorobenzene         | 3                                                   |
| 1,4-Dichlorobenzene         | ---                                                 |
| 1,4-Dioxane                 | 1 <sup>2</sup>                                      |
| 2-Butanone                  | 50                                                  |
| 2-Hexanone                  | 50                                                  |
| 4-Methyl-2-pentanone        | 502                                                 |
| Acetone                     | 50                                                  |
| Benzene                     | 1                                                   |
| Bromodichloromethane        | 50                                                  |
| Bromoform                   | 50                                                  |
| Bromomethane                | 5                                                   |
| Butylbenzene                | ---                                                 |
| Carbon Disulfide            | 60                                                  |
| Carbon tetrachloride        | 5                                                   |
| Chlorobenzene               | 5                                                   |
| Chloroethane                | 5                                                   |
| Chloroform                  | 7                                                   |
| Chloromethane               | 5                                                   |
| Cis- 1,3-Dichloropropene    | 0.4                                                 |
| cis-1,2-Dichloroethene      | 5                                                   |
| cis-1,2-Dichloroethylene    | ---                                                 |
| Cyclohexane                 | ---                                                 |
| Dibromochloromethane        | 50                                                  |
| Dichlorodifluoromethane     | 5                                                   |
| Ethyl Acetate               | ---                                                 |
| Ethylbenzene                | 5                                                   |
| Freon 113                   | ---                                                 |
| Hexachlorobenzene           | ---                                                 |

**Table 1B**  
Groundwater Criteria Table  
19 Clay Street and 60-62 Commercial Street  
Brooklyn, New York  
BCP Site No. C224390

| Contaminant                                                                                                                                                                                                                                                                                                                                                                      | Aqueous Water Quality Standards <sup>1</sup> , ug/L |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>Volatiles, Con't.</b>                                                                                                                                                                                                                                                                                                                                                         |                                                     |
| Hexachlorobutadiene                                                                                                                                                                                                                                                                                                                                                              | ---                                                 |
| Hexane                                                                                                                                                                                                                                                                                                                                                                           | ---                                                 |
| Isopropylbenzene                                                                                                                                                                                                                                                                                                                                                                 | 5                                                   |
| m,p-Xylene                                                                                                                                                                                                                                                                                                                                                                       | ---                                                 |
| m-Dichlorobenzene                                                                                                                                                                                                                                                                                                                                                                | ---                                                 |
| Methyl Acetate                                                                                                                                                                                                                                                                                                                                                                   | NS                                                  |
| Methyl ethyl ketone                                                                                                                                                                                                                                                                                                                                                              | ---                                                 |
| Methyl Isobutyl Ketone                                                                                                                                                                                                                                                                                                                                                           | ---                                                 |
| Methyl tert-butyl ether                                                                                                                                                                                                                                                                                                                                                          | 10                                                  |
| Methylcyclohexane                                                                                                                                                                                                                                                                                                                                                                | ---                                                 |
| Methylene chloride                                                                                                                                                                                                                                                                                                                                                               | 5                                                   |
| n-Propylbenzene                                                                                                                                                                                                                                                                                                                                                                  | ---                                                 |
| o-Dichlorobenzene                                                                                                                                                                                                                                                                                                                                                                | ---                                                 |
| o-Xylene                                                                                                                                                                                                                                                                                                                                                                         | ---                                                 |
| p-Dichlorobenzene                                                                                                                                                                                                                                                                                                                                                                | ---                                                 |
| sec-Butylbenzene                                                                                                                                                                                                                                                                                                                                                                 | ---                                                 |
| Styrene                                                                                                                                                                                                                                                                                                                                                                          | 5                                                   |
| tert-Butylbenzene                                                                                                                                                                                                                                                                                                                                                                | ---                                                 |
| Tertiary Butyl Alcohol                                                                                                                                                                                                                                                                                                                                                           | ---                                                 |
| Tetrachloroethene                                                                                                                                                                                                                                                                                                                                                                | 5                                                   |
| Toluene                                                                                                                                                                                                                                                                                                                                                                          | 5                                                   |
| trans-1,2-Dichloroethene                                                                                                                                                                                                                                                                                                                                                         | 5                                                   |
| trans-1,3-Dichloropropene                                                                                                                                                                                                                                                                                                                                                        | 0.4                                                 |
| Trichloroethene                                                                                                                                                                                                                                                                                                                                                                  | 5                                                   |
| Trichlorofluoromethane                                                                                                                                                                                                                                                                                                                                                           | 5                                                   |
| Vinyl Acetate                                                                                                                                                                                                                                                                                                                                                                    | ---                                                 |
| Vinyl Chloride                                                                                                                                                                                                                                                                                                                                                                   | 2                                                   |
| Xylene (mixed)                                                                                                                                                                                                                                                                                                                                                                   | 5                                                   |
| <b>Per- and Polyfluoroalkyl Substances (PFAS)</b>                                                                                                                                                                                                                                                                                                                                |                                                     |
| PFOA                                                                                                                                                                                                                                                                                                                                                                             | 0.01 <sup>2</sup>                                   |
| PFOS                                                                                                                                                                                                                                                                                                                                                                             | 0.01 <sup>2</sup>                                   |
| Notes:<br><sup>1</sup> - Division of Water Technical and Operational Guidance Values (TOGS)<br>Ambient Water Quality Standards and Guidance Values (AWQS), ug/L<br><sup>2</sup> - Guidance value for 1,4-Dioxane, PFOA, and PFOS is from the NYSDEC<br>Guidance to Regulate PFOA, PFOS, and 1,4-Dioxane in State Waters, dated<br>October 5, 2021<br>ug/L - micro gram per liter |                                                     |

**Table 1C**  
**Soil Vapor Criteria Table**  
**19 Clay Street 60-62 Comercial Street**  
**Brooklyn, NY**  
**NYSDEC BCP No. C224390**

| Volatile Organics in Air  | CAS No.  | NYSDOH Soil Vapor Intrusion Guidance Criteria |      |      |   | Toxicity | Decision Matrix |
|---------------------------|----------|-----------------------------------------------|------|------|---|----------|-----------------|
|                           |          | 1                                             | 2    | 3    | 4 |          |                 |
| 1,1,1-Trichloroethane     | 71556    | 2.5                                           | 20.6 | -    | - | L        | B               |
| 1,1,2,2-Tetrachloroethane | 79345    | 0.4                                           | -    | -    | - | M        | TD              |
| 1,1,2-Trichloroethane     | 79005    | 0.4                                           | <1.5 | -    | - | H        | TD              |
| 1,1-Dichloroethane        | 75343    | 0.4                                           | <0.7 | -    | - | L        | TD              |
| 1,1-Dichloroethene        | 75354    | 0.4                                           | <1.4 | -    | - | M        | B               |
| 1,2,4-Trichlorobenzene    | 120821   | 0.5                                           | <6.8 | -    | - | NA       | TD              |
| 1,2,4-Trimethylbenzene    | 95636    | 9.8                                           | 9.5  | -    | - | NA       | D               |
| 1,2-Dibromoethane         | 106934   | 0.4                                           | <1.5 | -    | - | H        | TD              |
| 1,2-Dichlorobenzene       | 95501    | 0.5                                           | <1.2 | -    | - | M        | TD              |
| 1,2-Dichloroethane        | 107062   | 0.4                                           | <0.9 | -    | - | H        | TD              |
| 1,2-Dichloropropane       | 78875    | 0.4                                           | <1.6 | -    | - | M        | TD              |
| 1,3,5-Trimethylbenzene    | 108678   | 3.9                                           | 3.7  | -    | - | M        | D               |
| 1,3-Butadiene             | 106990   | -                                             | <3.0 | -    | - | H        | TD              |
| 1,3-Dichlorobenzene       | 541731   | 0.5                                           | <2.4 | -    | - | M        | TD              |
| 1,4-Dichlorobenzene       | 106467   | 1.2                                           | 5.5  | 344  | - | M        | TD              |
| 1,4-Dioxane               | 123911   | -                                             | -    | -    | - | M        | TD              |
| 2,2,4-Trimethylpentane    | 540841   | 5                                             | -    | -    | - | M        | D               |
| 2-Butanone                | 78933    | 16                                            | 12   | -    | - | M        | TD              |
| 2-Hexanone                | 591786   | -                                             | -    | -    | - | NA       | TD              |
| 3-Chloropropene           | 107051   | -                                             | -    | -    | - | M        | TD              |
| 4-Ethyltoluene            | 622968   | -                                             | 3.6  | -    | - | NA       | TD              |
| 4-Methyl-2-pentanone      | 108101   | 1.9                                           | 6    | -    | - | M        | TD              |
| Acetone                   | 67641    | 115                                           | 98.9 | 45.8 | - | L        | TD              |
| Benzene                   | 71432    | 13                                            | 9.4  | 10   | - | H        | D               |
| Benzyl chloride           | 100447   | -                                             | <6.8 | -    | - | H        | TD              |
| Bromodichloromethane      | 75274    | -                                             | -    | -    | - | M        | TD              |
| Bromoform                 | 75252    | -                                             | -    | -    | - | M        | TD              |
| Bromomethane              | 74839    | 0.5                                           | <1.7 | -    | - | M        | TD              |
| Carbon disulfide          | 75150    | -                                             | 4.2  | -    | - | M        | TD              |
| Carbon tetrachloride      | 56235    | 1.3                                           | <1.3 | 1.1  | - | H        | A               |
| Chlorobenzene             | 108907   | 0.4                                           | <0.9 | -    | - | M        | TD              |
| Chloroethane              | 75003    | 0.4                                           | <1.1 | -    | - | L        | TD              |
| Chloroform                | 67663    | 1.2                                           | 1.1  | 6.34 | - | H        | TD              |
| Chloromethane             | 74873    | 4.2                                           | 3.7  | -    | - | M        | TD              |
| cis-1,2-Dichloroethene    | 156592   | 0.4                                           | <1.9 | -    | - | M        | B               |
| cis-1,3-Dichloropropene   | 10061015 | 0.4                                           | <2.3 | -    | - | NA       | TD              |
| Cyclohexane               | 110827   | 6.3                                           | -    | -    | - | L        | D               |

**Table 1C**  
**Soil Vapor Criteria Table**  
**Way Street 60-62 Commercial S**  
**Brooklyn, NY**  
**NYSDEC BCP No. C224390**

[illegible]



**Table 2**  
Typical Analytical Parameters, Methods, Preservation, Holding Time and Container Requirements  
19 Clay Street and 60-62 Commercial Street, Brooklyn NY  
NYSDEC BCP Site No. C224390

| Sample Matrix                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Analytical Parameter                  | Numer of Samples <sup>1</sup> | EPA Analytical Method            | Sample Preservation                                 | Holding Time <sup>2</sup>                                         | Sample Container <sup>3</sup>         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------|----------------------------------|-----------------------------------------------------|-------------------------------------------------------------------|---------------------------------------|
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | VOCs                                  | 21                            | SW-846 Method 8260C/5035         | 1 - Methanol, 2 - Water; Cool to 4° C; no headspace | 14 days to analysis                                               | (3) Vial                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TCL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PCBs                                  | 21                            | SW-846 Method 8082A              | Cool to 4° C                                        | 365 days to analysis                                              | (1) 250 mL amber glass jar            |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Pesticides                            | 21                            | SW-846 Method 8081A              | Cool to 4° C                                        | 14 days to extraction                                             | (1) 250 mL amber glass jar            |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SVOCs                                 | 21                            | SW-846 Method 8270D              | Cool to 4° C                                        | 14 days to extraction                                             | (1) 250 mL amber glass jar            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TCL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1,4-Dioxane                           | 21                            | SW-846 Method 8270D              | Cool to 4° C                                        | 7 days to extraction                                              | (2) 250 mL amber glass jars           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                       |                               |                                  |                                                     |                                                                   |                                       |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Metals                                | 21                            | SW-846 Method 6010D Series       | Cool to 4° C                                        | 180 days to analysis                                              | (1) 60 mL glass jar                   |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Mercury                               | 21                            | SW-846 Method 7471B              | Cool to 4° C                                        | 28 days to analysis                                               | (1) 60 mL glass jar                   |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Cyanide                               | 21                            | SW-846 Method 9010C/9012B        | Cool to 4° C                                        | 14 days to analysis                                               | (1) 250 mL amber glass jar            |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Herbicides                            | 21                            | SW-846 Method 8151A              | Cool to 4° C                                        | 14 days to extraction                                             | (1) 250 mL amber glass jar            |
| Soil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PFAs                                  | 21                            | EPA Method 1633                  | Cool to 4° C                                        | 14 Days                                                           | (1) 250 mL plastic container          |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | VOCs                                  | 10                            | SW-846 Method 8260C              | HCl; Cool to 4° C; no headspace                     | 14 days to analysis                                               | (3) Vial                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TCL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | VOCs with TICs, including 1,4-Dioxane | 10                            | SW-846 Method 8260C              | HCl; Cool to 4° C; no headspace                     | 14 days to analysis                                               | (3) Vial                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TCL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1,4-Dioxane                           | 10                            | SW-846 Method 8270D              | Cool to 4° C                                        | 7 days to analysis                                                | (2) 250 mL amber glass jar            |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SVOCs                                 | 10                            | SW-846 Method 8270D              | Cool to 4° C                                        | 7 days to extraction                                              | (2) 250 mL amber glass jar            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TCL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SVOCs with TICs                       | 10                            | SW-846 Method 8270D              | Cool to 4° C                                        | 7 days to extraction                                              | (2) 250 mL amber glass jar            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TCL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Metals- total                         | 10                            | SW-846 Method 6020B/7470A Series | HNO <sub>3</sub> ; Cool to 4° C                     | 28 days to analysis for Hg; 180 days to analysis for other        | (1) 500 mL plastic container          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TAL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Metals-dissolved                      | 10                            | SW-846 Method 6020B/7470A Series | HNO <sub>3</sub> ; Cool to 4° C                     | 28 days to analysis for Hg; 180 days to analysis for other metals | (1) 500 mL plastic container          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (TAL)                                 |                               |                                  |                                                     |                                                                   |                                       |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Pesticides (TCL)                      | 10                            | SW-846 Method 8081B              | Cool to 4° C                                        | 7 days to extraction                                              | (2) 120 mL amber glass jar            |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Herbicides (TCL)                      | 10                            | SW-846 Method 8151A              | Cool to 4° C                                        | 7 days to extraction                                              | (2) 1000 mL amber glass jar           |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PCBs                                  | 10                            | SW-846 Method 8082A              | Cool to 4° C                                        | 365 days to analysis                                              | (1) 250 mL amber glass jar            |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Cyanide                               | 10                            | SW-846 Method 9012A              | Cool to 4° C                                        | 14 days to analysis                                               | (1) 250 mL amber glass jar            |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Mercury                               | 10                            | SW-846 Method 7470 A             | HNO <sub>3</sub> ; Cool to 4° C                     | 28 days to analysis                                               | (1) 250 mL plastic container          |
| Groundwater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PFAs                                  | 10                            | EPA Method 1633                  | Cool to 4° C                                        | 14 Days                                                           | (1) 250 mL plastic container          |
| Soil Gas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | VOCs                                  | 9                             | EPA Method TO-15                 | None                                                | 14 days to analysis                                               | (1) Evacuated 6-Liter SUMMA® canister |
| Notes:<br><sup>1</sup> Actual number of samples may vary depending on field conditions, sample material availability, and field observations. See RIWP for estimates.<br><sup>2</sup> Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.<br><sup>3</sup> MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices |                                       |                               |                                  |                                                     |                                                                   |                                       |

**Table 3**  
Typical Laboratory Data Quality Objectives  
Soil Samples  
19 Clay St. 60-62 Commercial St., Brooklyn, NY  
NYCDEC BCP Site No. C224490

| Parameter                                         | Method                    | Matrix | Accuracy Control Limits                                                                                                                                                                                                                                                                                               | Accuracy Frequency Requirements                                                                                     | Precision (RPD) Control Limits                                                                | Precision Frequency Requirements                                                                      |
|---------------------------------------------------|---------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| VOCs (TCL)                                        | SW-846 Methods 8260B/5035 | Soil   | <u>Surrogates</u> % Rec.<br>1,2-Dichloroethane-d4    70-130<br>4-Bromofluorobenzene    70-130<br>Dibromofluoromethane    70-130<br>Toluene-d8                70-130<br>2-Chloroethoxyethane    70-130<br><br>Matrix Spikes<br>30-151% recovery                                                                        | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 30 per matrix type | <u>Field Duplicates</u><br><br>RPD <30<br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD <30        | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 30 per matrix type |
| VOCs with Tentatively Identified Compounds (TICs) | SW-846 Method 8260C       | Soil   | <u>Surrogates</u> % Rec.<br>1,2-Dichloroethane-d4    70-130<br><br>4-Bromofluorobenzene    70-130<br>Dibromofluoromethane    70-130<br>Toluene-d8                70-130<br><br>Matrix Spikes<br>36-162 % recovery                                                                                                     | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates</u><br><br>RPD <30<br><br><u>MS/MSDs</u> <u>RPD</u><br>RPD<30             | <u>Field Duplicates:</u><br>One per 20<br><br><u>MS/MSDs:</u><br>One per 20                           |
| PCBs                                              | SW-846 Method 8082A       | Soil   | <u>Surrogates</u> % Rec.<br>2,4,5,6-Tetrachloro-m-xylene    30-150<br>Decachlorobiphenyl                30-150<br>Matrix Spikes<br>40-140% recovery                                                                                                                                                                   | <u>Surrogates:</u><br>All samples, standards, QC samples<br><u>Matrix Spikes:</u><br>One per 20 per matrix type     | <u>Field Duplicates</u><br><br>RPD <50<br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD<50             | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |
| SVOCs                                             | SW-846 Method 8270D       | Soil   | <u>Surrogates</u> % Rec.<br>Phenol-d6                    10-120<br>2-Fluorophenol                25-120<br>2,4,6-Tribromophenol        10-136<br>Nitrobenzene-d5                23-120<br>2-Fluorobiphenyl                30-120<br>4-Terphenyl-d14                18-120<br><u>Matrix Spikes</u><br>14-144% recovery | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 50 per matrix type | <u>Field Duplicates</u><br><br>RPD <50<br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br><u>MS/MSDs</u> | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |
| SVOCs with TICs                                   | SW-846 Method 8270D       | Soil   | <u>Surrogates</u> % Rec.<br><br>Phenol-d5                    10-120<br>2-Fluorophenol                21-120<br>2,4,6-Tribromophenol        10-120<br>Nitrobenzene-d5                23-120<br>2-Fluorobiphenyl                15-120<br>4-Terphenyl-d14                41-149<br><br>Matrix Spikes<br>14-144%         | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br>Matrix Spikes:<br>One per 20                        | <u>Field Duplicates</u><br><br>RPD <50<br><br><u>MS/MSDs</u> <u>RPD</u><br>RPD<50             | <u>Field Duplicates:</u><br><br>One per 20<br><br><u>MS/MSDs:</u><br>One per 20                       |
| 1,4-Dioxane                                       | SW-846 Method 8270D       | Soil   | <u>Surrogates</u> % Rec.<br>1,4-Dioxane-d8                15-110<br><br><u>Matrix Spikes</u><br>40-140% recovery                                                                                                                                                                                                      | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates</u><br><br>RPD <30<br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD<30         | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20                 |
| Pesticides (TCL)                                  | SW-846 Method 8081A       | Soil   | <u>Surrogates</u> % Rec.<br>Decachlorobiphenyl                30-150<br>Tetrachloro-m-xylene                30-150<br><u>Matrix Spikes</u><br>30-150% Recovery                                                                                                                                                        | <u>Surrogates:</u><br>All samples, standards, QC samples<br><u>Matrix Spikes:</u><br>One per 20 per matrix type     | <u>Field Duplicates</u><br><br>RPD <50<br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD<50             | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |
| Total Petroleum Hydrocarbons                      | SW-846 Method 8015B       | Soil   | <u>Surrogates</u> % Rec.<br>o-Terphenyl                    27-153<br>Tetracosane-d50                28-148<br>5α-androstane                27-148<br><br>TPH-DRO                    10-149                                                                                                                            | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br>One per 20 per matrix type                          | <u>Field Duplicates</u><br><br>RPD <50<br><br>TPH-DRO                    44                   | <u>Field Duplicates:</u><br>One per 20 per soils<br><br>One per 20 per matrix type                    |
| Herbicides                                        | SW-846 Method 8151A       | Soil   | <u>Surrogates</u> % Rec.<br>2,4-DCAA                    30-150<br><br><u>Matrix Spikes</u><br>30-150% Recovery                                                                                                                                                                                                        | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20 per matrix type | <u>Field Duplicates</u><br><br>RPD <50<br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD<50         | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |
| Metals (TAL)                                      | SW-846 Method 6010D       | Soil   | <u>Surrogates</u> % Rec.<br><br><u>Matrix Spikes</u><br>75-125% recovery                                                                                                                                                                                                                                              | <u>Surrogates:</u><br><br><u>Matrix Spikes:</u><br>One per 20 per matrix type                                       | <u>Field Duplicates</u><br><br>RPD <20<br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD <20            | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |

**Table 3**  
Typical Laboratory Data Quality Objectives  
Soil Samples  
19 Clay St. 60-62 Commercial St., Brooklyn, NY  
NYCDEC BCP Site No. C224490

| Parameter                                                                                                                                                                                                                            | Method                                 | Matrix | Accuracy Control Limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Accuracy Frequency Requirements                                                                                                     | Precision (RPD) Control Limits                                                                 | Precision Frequency Requirements                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| PFAs                                                                                                                                                                                                                                 | LCMSMS-<br><br>Isotope<br><br>Dilution | Soil   | <u>Surrogates</u><br>% Rec.<br>Perfluoro[13C4]Butanoic Acid (MPFBA)<br>61-135<br>Perfluoro[13C4]Butanoic Acid (MPFBA)<br>58-132<br>Perfluoro[13C5]Pentanoic Acid (MSPFPEA)<br>62-163<br>Perfluoro[13C5]Pentanoic Acid (MSPFPEA)<br>58-150<br>Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)<br>70-131<br>Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)<br>74-139<br>Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (MSPFHxA)<br>57-129<br>Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (MSPFHxA)<br>66-128<br>Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)<br>60-129<br>Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)<br>71-129<br>Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)<br>71-134<br>Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)<br>78-139<br>Perfluoro[13C8]Octanoic Acid (M8PFOA)<br>62-129<br>Perfluoro[13C8]Octanoic Acid (M8PFOA)<br>75-130<br>1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)<br>14-147<br>1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)<br>20-154<br>Perfluoro[13C9]Nonanoic Acid (M9PFNA)<br>59-139<br>Perfluoro[13C9]Nonanoic Acid (M9PFNA)<br>72-140<br>Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)<br>79-136<br>Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)<br>69-131<br>Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)<br>75-130<br>Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)<br>62-124<br>1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)<br>19-175<br>1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)<br>10-162<br>N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)<br>24-116<br>N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)<br>31-134<br>Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)<br>61-155<br>Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)<br>55-137<br>Perfluoro[13C8]Octanesulfonamide (M8FOSA)<br>10-112<br>Perfluoro[13C8]Octanesulfonamide (M8FOSA)<br>10-117<br>N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)<br>34-137<br>N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)<br>27-126<br>Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)<br>48-131<br>Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)<br>54-150<br>Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)<br>22-136<br>Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)<br>24-159<br><br><u>Matrix Spikes</u><br>46-182% recovery | <u>Surrogates:</u><br><br>All samples, standards, QC samples<br><br><br><br><u>Matrix Spikes:</u><br><br>One per 20 per matrix type | <u>Field Duplicates</u><br><br>RPD <30<br><br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br><br>RPD <30 | <u>Field Duplicates:</u><br><br>One per 20 per soils<br><br><br><br><u>MS/MSDs:</u><br><br>One per 20 per matrix type |
| Mercury                                                                                                                                                                                                                              | SW-846<br>Method<br>7471B              | Soil   | <u>Surrogates</u><br>% Rec.<br><br><br><u>Matrix Spikes</u><br>80-125% recovery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <u>Surrogates:</u><br><br><br><u>Matrix Spikes:</u><br>One per 20 per matrix type                                                   | <u>Field Duplicates</u><br><br>RPD <20<br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD <20         | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type                 |
| Cyanide                                                                                                                                                                                                                              | SW-846<br>Method<br>9012A              | Soil   | <u>Surrogates</u><br>% Rec.<br><br><br><u>Matrix Spikes</u><br>75-125% Recovery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <u>Surrogates:</u><br><br><br><u>Matrix Spikes:</u><br>One per 35 per matrix type                                                   | <u>Field Duplicates</u><br><br>RPD <35<br><br><u>MS/MSDs</u> ( <u>RPD</u> )<br>RPD <35         | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><u>MS/MSDs:</u><br>One per 20 per matrix type                 |
| Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.<br>Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis. |                                        |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                     |                                                                                                |                                                                                                                       |

**Table 4**  
Typical Laboratory Data Quality Objectives  
Groundwater Samples  
19 Clay St. 60-62 Commercial St., Brooklyn, NY  
NYSDEC BCP Site No, C224390

| Parameter                                         | Method               | Matrix      | Accuracy Control Limits                                                                                                                                                                                                                                                                                        | Accuracy Frequency Requirements                                                                                     | Precision (RPD) Control Limits                                                                                                            | Precision Frequency Requirements                                                                |
|---------------------------------------------------|----------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| VOCs (TCL)                                        | SW-846 Method 8260C  | Groundwater | <u>Surrogates</u> % Rec.<br>1,2-Dichloroethane-d4    70-130<br><br>4-Bromofluorobenzene    70-130<br>Dibromofluoromethane    70-130<br>Toluene-d8                      70-130<br><br><u>Matrix Spikes</u><br>36-162 % recovery                                                                                 | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates</u><br><br>RPD <20<br><br><u>MS/MSDs</u> <u>RPD</u><br>RPD <20                                                        | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20                 |
| VOCs with Tentatively Identified Compounds (TICs) | SW-846 Method 8260C  | Groundwater | <u>Surrogates</u> % Rec.<br>1,2-Dichloroethane-d4    70-130<br>4-Bromofluorobenzene    70-130<br>Dibromofluoromethane    70-130<br>Toluene-d8                      70-130<br><br><u>Matrix Spikes</u><br>36-162 % recovery                                                                                     | <u>Surrogates:</u><br>All samples, standards, QC<br><br><u>Matrix Spikes:</u><br>One per 20                         | <u>Field Duplicates</u><br><br>RPD <20<br><br><u>MS/MSDs</u> <u>RPD</u><br>RPD <20                                                        | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20                 |
| SVOCs TCL                                         | SW-846 Method 8270D  | Groundwater | <u>Surrogates</u> % Rec.<br>Phenol-d5                      10-120<br>2-Fluorophenol                21-120<br>2,4,6-Tribromophenol      10-120<br>Nitrobenzene-d5              23-120<br>2-Fluorobiphenyl            15-120<br>4-Terphenyl-d14            41-149<br><br><u>Matrix Spikes</u><br>14-144%         | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates</u><br><br>RPD <50<br><br><u>MS/MSDs</u> <u>RPD</u><br>RPD <50                                                        | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20                 |
| SVOCs with TICs                                   | SW-846 Method 8270D  | Groundwater | <u>Surrogates</u> % Rec.<br><br>Phenol-d5                      10-120<br><br>2-Fluorophenol                21-120<br>2,4,6-Tribromophenol      10-120<br>Nitrobenzene-d5              23-120<br>2-Fluorobiphenyl            15-120<br>4-Terphenyl-d14            41-149<br><br><u>Matrix Spikes</u><br>14-144% | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates:</u><br><br>RPD <50<br><br><u>MS/MSDs</u> <u>RPD</u><br>RPD <50                                                       | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20                 |
| 1,4-Dioxane                                       | SW-846 Method 8270D  | Groundwater | <u>Surrogates</u> % Rec.<br>1,4-Dioxane-d8              15-110<br><br><u>Matrix Spikes</u><br>40-140% recovery                                                                                                                                                                                                 | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates</u><br><br>RPD <30<br><u>Matrix Duplicates</u><br>RPD<30                                                              | <u>Field Duplicates:</u><br>One per 20 per soils<br><br><br><u>MS/MSDs:</u><br>One per 20       |
| Metals (Total and Dissolved)                      | SW-846 Methods 6020B | Groundwater | <u>Matrix Spikes</u><br>75-125% recovery                                                                                                                                                                                                                                                                       | <u>Surrogates:</u><br>All samples, standards, QC samples<br><u>Matrix Spikes:</u><br>One per 20                     | <u>Field Duplicates</u><br><br>RPD <20<br><br><u>Matrix Duplicates</u><br><br>RPD <20                                                     | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20                 |
| Mercury (Total and Dissolved)                     | SW-846 Methods 7470A | Groundwater | <u>Matrix Spikes</u><br>75-125% recovery                                                                                                                                                                                                                                                                       | <u>Surrogates:</u><br>All samples, standards, QC samples<br><u>Matrix Spikes:</u><br>One per 20                     | <u>Field Duplicates</u><br><br>RPD <35 (dissolved)<br>RPD<20 (Total)<br><u>Matrix Duplicates</u><br>RPD <35 (dissolved)<br>RPD<20 (Total) | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20                 |
| PCBs                                              | SW-846 Method 8082A  | Groundwater | <u>Surrogates</u> % Rec.<br><br>2,4,5,6-Tetrachloro-m-xylene    30-150<br><br>Decachlorobiphenyl                30-150<br><u>Matrix Spikes</u><br>40-140% recovery                                                                                                                                             | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20 per matrix type | <u>Field Duplicates</u><br><br>RPD <50<br><u>MS/MSDs</u> <u>(RPD)</u><br>RPD<50                                                           | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |
| Herbicides                                        | SW-846 Method 8151A  | Groundwater | <u>Surrogates</u> % Rec.<br><br>2,4-DCAA                      30-150<br><br><u>Matrix Spikes</u><br>30-150% Recovery                                                                                                                                                                                           | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20 per matrix type | <u>Field Duplicates:</u><br><br>RPD <50<br><br><u>MS/MSDs</u> <u>(RPD)</u><br>RPD<50                                                      | <u>Field Duplicates:</u><br>One per 20<br><br><br><u>MS/MSDs:</u><br>One per 20 per matrix type |

**Table 4**  
Typical Laboratory Data Quality Objectives  
Groundwater Samples  
19 Clay St. 60-62 Commercial St., Brooklyn, NY  
NYSDEC BCP Site No, C224390

| Parameter                                                                                                                      | Method              | Matrix      | Accuracy Control Limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Accuracy Frequency Requirements                                                                                     | Precision (RPD) Control Limits                                                    | Precision Frequency Requirements                                                       |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Pesticides (TCL)                                                                                                               | SW-846 Method 8081B | Groundwater | <u>Surrogates</u> % Rec.<br>Decachlorobiphenyl 15-142<br><br>2,4,5,6-Tetrachloro-m-xylene 36-126<br><br><u>Matrix Spikes</u><br>30-150% recovery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20                 | <u>Field Duplicates</u><br><br>RPD <30<br><br><u>MS/MSDs</u> (RPD)<br>RPD <30     | <u>Field Duplicates:</u><br>One per 20<br><br><u>MS/MSDs:</u><br>One per 20            |
| PFAs                                                                                                                           | EPA Method 1633     | Grounwater  | <u>Surrogates</u><br>Perfluoro[13C4]Butanoic Acid (MPFBA)<br>Perfluoro[13C4]Butanoic Acid (MPFBA)<br>Perfluoro[13C5]Pentanoic Acid (M5PFPEA)<br>Perfluoro[13C5]Pentanoic Acid (M5PFPEA)<br>Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)<br>Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)<br>Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)<br>Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)<br>Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)<br>Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)<br>Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)<br>Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)<br>Perfluoro[13C8]Octanoic Acid (M8PFOA)<br>Perfluoro[13C8]Octanoic Acid (M8PFOA)<br>1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-Perfluoro[13C9]Nonanoic Acid (M9PFNA)<br>Perfluoro[13C9]Nonanoic Acid (M9PFNA)<br>Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)<br>Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)<br>Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)<br>Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)<br>1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid<br>N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid<br>Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)<br>Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)<br>Perfluoro[13C8]Octanesulfonamide (M8FOSA)<br>Perfluoro[13C8]Octanesulfonamide (M8FOSA)<br>N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid<br>N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid<br>Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)<br>Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)<br>Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)<br>Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)<br><br><u>Matrix Spikes</u><br>46-182% recovery | <u>Surrogates:</u><br>All samples, standards, QC samples<br><br><u>Matrix Spikes:</u><br>One per 20 per matrix type | <u>Field Duplicates</u><br><br>RPD <30<br><br><u>MS/MSDs</u> (RPD)<br>RPD <30     | <u>Field Duplicates:</u><br>One per 20<br><br><u>MS/MSDs:</u><br>One per 20 per matrix |
| Cyanide                                                                                                                        | EPA Method 9012B    | Groundwater | <u>Matrix Spikes</u><br>75-125% recovery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <u>Surrogates:</u><br>All samples, standards, QC samples<br><u>Matrix Spikes:</u><br>One per 35                     | <u>Field Duplicates</u><br><br>RPD <35<br><br><u>Matrix Duplicates</u><br>RPD <35 | <u>Field Duplicates:</u><br>One per 20<br><br><u>Matrix Duplicates:</u><br>One per 20  |
| Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.                             |                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                     |                                                                                   |                                                                                        |
| Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis. |                     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                     |                                                                                   |                                                                                        |

**Table 5**  
Typical Laboratory Data Quality Objectives  
Soil Gas Samples  
19 Clay St. 60-62 Commercial St., Brooklyn, NY  
NYSDEC BCP Site No, C224390

| Parameter | Method           | Matrix   | Accuracy Control Limits                                 | Accuracy Frequency Requirements                          | Precision (RPD) Control Limits      | Precision Frequency Requirements       |
|-----------|------------------|----------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------|----------------------------------------|
| VOCs      | EPA Method TO-15 | Soil Gas | <u>Surrogates</u> % Rec.<br>4-Bromofluorobenzene 78-124 | <u>Surrogates:</u><br>All samples, standards, QC samples | <u>Matrix Duplicates</u><br>RPD £30 | <u>Matrix Duplicates</u><br>One per 20 |
|           |                  |          |                                                         |                                                          |                                     |                                        |

**Table 6**  
QC Sample Preservation and Container Requirements  
19 Clay St. 60-62 Commercial St., Brooklyn, NY  
NYSDEC BCP Site No. C224390

| Sample Matrix | Analytical Parameter | No. of Samples | EPA Analytical Method            | Sample Preservation                    | Holding Time <sup>1</sup> | Sample Container             |
|---------------|----------------------|----------------|----------------------------------|----------------------------------------|---------------------------|------------------------------|
|               |                      |                |                                  |                                        |                           |                              |
| Soil          | VOCs                 | 2              | SW-846 Method 8260C/5035         | 1 - Methanol, 2 - Water; Cool to 4° C; | 14 days to analysis       | (3) Vial Preserved           |
|               | (TCL)                |                |                                  | no headspace                           |                           |                              |
| Soil          | PCBs                 | 2              | SW-846 Method 8082A              | Cool to 4° C                           | 365 days to analysis      | (1) 250 mL amber glass jar   |
| Soil          | SVOCs                | 2              | SW-846 Method 8270D              | Cool to 4° C                           | 14 days to extraction     | (1) 250 mL amber glass jar   |
|               | (TCL)                |                |                                  |                                        |                           |                              |
| Soil          | 1,4-Dioxane          | 2              | SW-846 Method 8270D              | Cool to 4° C                           | 7 days to extraction      | (2) 250 mL amber glass jars  |
|               |                      |                |                                  |                                        |                           |                              |
| Soil          | Metals               | 2              | SW-846 Method 6010D Series       | Cool to 4° C                           | 180 days to analysis      | (1) 60 mL glass jar          |
|               | (TAL)                |                |                                  |                                        |                           |                              |
| Soil          | Mercury              | 2              | SW-846 Method 7471B              | Cool to 4° C                           | 28 days to analysis       | (1) 60 mL glass jar          |
| Soil          | Cyanide              | 2              | SW-846 Method 9010C/9012B        | Cool to 4° C                           | 14 days to analysis       | (1) 250 mL amber glass jar   |
| Soil          | Herbicides           | 2              | SW-846 Method 8151A              | Cool to 4° C                           | 14 days to extraction     | (1) 250 mL amber glass jar   |
| Soil          | Pesticides           | 2              | SW-846 Method 8141A <sup>6</sup> | Cool to 4° C                           | 14 days to extraction     | (1) 300 mL amber glass jar   |
| Soil          | PFAs                 | 2              | EPA Method 1633                  | Cool to 4° C                           | 14 Days                   | (1) 250 mL plastic container |



**Table 6**  
**QC Sample Preservation and Container Requirements**  
 19 Clay St. 60-62 Commercial St., Brooklyn, NY  
 NYSDEC BCP Site No. C224390

|                                                                                                                               |                        |   |                                  |                                             |                                                                   |                                       |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|---|----------------------------------|---------------------------------------------|-------------------------------------------------------------------|---------------------------------------|
| Groundwater                                                                                                                   | VOCs (TCL)             | 1 | SW-846 Method 8260C              | HCl; Cool to 4 <sup>0</sup> C; no headspace | 14 days to analysis                                               | (3) Vial                              |
| Groundwater                                                                                                                   | 1,4-Dioxane            | 1 | SW-846 Method 8270D              | Cool to 4 <sup>0</sup> C                    | 7 days to analysis                                                | (2) 250 mL amber glass jar            |
| Groundwater                                                                                                                   | SVOCs (TCL)            | 1 | SW-846 Method 8270D              | Cool to 4 <sup>0</sup> C                    | 7 days to extraction                                              | (2) 250 mL amber glass jar            |
| Groundwater                                                                                                                   | Metals- total (TAL)    | 1 | SW-846 Method 6020B/7470A Series | HNO <sub>3</sub> ; Cool to 4 <sup>0</sup> C | 28 days to analysis for Hg; 180 days to analysis for other metals | (1) 500 mL plastic container          |
| Groundwater                                                                                                                   | Metals-dissolved (TAL) | 1 | SW-846 Method 6020B/7470A Series | HNO <sub>3</sub> ; Cool to 4 <sup>0</sup> C | 28 days to analysis for Hg; 180 days to analysis for other metals | (1) 500 mL plastic container          |
| Groundwater                                                                                                                   | Pesticides (TCL)       | 1 | SW-846 Method 8081B              | Cool to 4 <sup>0</sup> C                    | 7 days to extraction                                              | (2) 120 mL amber glass jar            |
| Groundwater                                                                                                                   | Herbicides (TCL)       | 1 | SW-846 Method 8151A              | Cool to 4 <sup>0</sup> C                    | 7 days to extraction                                              | (2) 1000 mL amber glass jar           |
| Groundwater                                                                                                                   | PCBs                   | 1 | SW-846 Method 8082A              | Cool to 4 <sup>0</sup> C                    | 365 days to analysis                                              | (1) 250 mL amber glass jar            |
| Groundwater                                                                                                                   | Cyanide                | 1 | SW-846 Method 9012A              | Cool to 4 <sup>0</sup> C                    | 14 days to analysis                                               | (1) 250 mL amber glass jar            |
| Groundwater                                                                                                                   | Mercury                | 1 | SW-846 Method 7470 A             | HNO <sub>3</sub> ; Cool to 4 <sup>0</sup> C | 28 days to analysis                                               | (1) 250 mL plastic container          |
| Groundwater                                                                                                                   | PFAs                   | 1 | EPA Method 1633                  | Cool to 4 <sup>0</sup> C                    | 14 Days                                                           | (1) 250 mL plastic container          |
| Soil Gas                                                                                                                      | VOCs                   | 1 | EPA Method TO-15                 | None                                        | 14 days to analysis                                               | (1) Evacuated 6-Liter SUMMA® canister |
| Notes:<br>1 Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times. |                        |   |                                  |                                             |                                                                   |                                       |



## **APPENDIX B – HEALTH AND SAFETY PLAN**

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

### 1. CLIENT/SITE/PROJECT INFORMATION

Client: Clay Properties, LLC

Site Address: 19-27 Clay Street and 60-62 Commercial Street, Brooklyn, NY

Site Description (be sure to list pertinent site features, chemicals used at the facility, and other potential hazard sources):

The site can be best described as two separate areas. There is 1) a two-story unoccupied warehouse located at 19 Clay Street and 2) a yard area located at 60-62 Commercial Street. The site is gated to avoid any trespassers entering the premises. The yard area does have storage trailers located within the gate.

Work Environment (active manufacturing, office, vacant site, undeveloped property, etc.):

Warehouse and open lot

Job/Project #: 41.0163281.00

Field Start Date: TBD

Field Finish Date: TBD

Site is Covered by the Following Regulations:

OSHA HAZWOPER Standard ☒

Mine Safety and Health Administration ☐

OSHA Construction Regulations ☒

### 2. EMERGENCY INFORMATION

Hospital Name: NYU Langone

Hospital Phone: 646-929-7800

Hospital Address: 706 Broadway, Brooklyn, NY

Directions and Street Map Attached: ☒ Yes

Local Fire #: 911

Local Ambulance #: 911

Local Police #: 911

WorkCare Incident Intervention Services:

For non-emergencies, if an employee becomes hurt or sick call 888-449-7787

Other Emergency Contact(s): Reinbill Maniquez

Phone #'s: 347-443-1059

Site-Specific Emergency Preparedness/Response Procedures/Concerns: See Site Access Safety Addendum (attached)



|                                                                                                                                                                                  |                                                                                                                                                                                                             |                                                                                                                                                                |                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>LIFTING</b></p> <p>Get help lifting or carrying anything over 50 pounds</p>            |  <p><b>SITE RECON</b></p> <p>Walk your site before starting work to find and mark slips/trips/falls and insect nests</p> |  <p><b>DRIVING</b></p> <p>Don't use your mobile phone while driving</p>     |  <p><b>ERGONOMICS</b></p> <p>Take a 5-minute break for every hour you work, whether it's in the office or the field</p> |
|  <p><b>CUTS</b></p> <p>Wear cut-resistant gloves when using knives or other sharp objects</p> |  <p><b>PPE</b></p> <p>At a minimum, always wear safety glasses and protective footwear in the field</p>                  |  <p><b>HASP</b></p> <p>Develop a HASP and have it with you in the field</p> |  <p><b>WORKCARE</b></p> <p>Without delay, call WorkCare immediately for any minor injury or illness at 888-449-7787</p> |

- All EHS Events must be reported immediately to the Project Manager and to the GZA People-Based Safety mobile app.
- In the event of a chemical release greater than 5 gallons, site personnel will evacuate the affected area and relocate to an upwind location. The GZA Field Safety Officer and client site representative shall be contacted immediately.
- Site work shall not be conducted during severe weather, including high winds and lightning. In the event of severe weather, stop work, lower any equipment (drill rigs), and evacuate the affected area.

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

| 3. SCOPE OF WORK                                                                            |                                                                                                                  |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| General project description, and phase(s) or work to which this H&S Plan applies.           | Remedial Investigation, Field Sampling                                                                           |
| Specific Tasks Performed by GZA:                                                            | Drilling Observation, soil sampling, groundwater sampling, soil vapor sampling, soil handling, and field logging |
| Concurrent Tasks to be Performed by GZA-hired Subcontractors (List Subcontractors by Name): | TBD Drillers - Drilling, soil sampling, groundwater sampling, soil vapor sampling, soil handling                 |
| Concurrent Tasks to be Performed by Others:                                                 | N/A                                                                                                              |

|                                                                                                                                                                                                                                                                                              |                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Any OSHA PERMIT-REQUIRED CONFINED SPACE entry?<br><div style="display: flex; justify-content: space-around; margin-top: 5px;"> <input type="checkbox"/> YES         <input checked="" type="checkbox"/> NO       </div> IF YES, ADD CONFINED SPACE ENTRY PERMIT FOR THAT PORTION OF THE WORK | Any INDOOR fieldwork? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO<br>IF YES, EXPLAIN: |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|

| 4. SUB-SURFACE WORK, UNDERGROUND UTILITY LOCATION                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Will subsurface explorations be conducted as part of this work (drilling or excavation)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br>Will GZA personnel be required to use a hand-auger as part of this work? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                                                                           |                                                                                                                                                                                    |
| Site property ownership where underground explorations will be conducted on:<br>Clay Properties, LLC                                                                                                                                                                                                                                                                                   | Public Access Property <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Private Property <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Have Necessary Underground Utility Notifications for Subsurface Work Been Made?                                                                                                                                                                                                                                                                                                        | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> Yet to be conducted                                                                                               |
| Specify Clearance Date & Time, Dig Safe Clearance I.D. #, And Other Relevant Information: GZA will review utility clearance with driller prior to field work.                                                                                                                                                                                                                          |                                                                                                                                                                                    |
| <b>IMPORTANT! For subsurface work, prior to the initiation of ground penetrating activities, GZA personnel to assess whether the underground utility clearance (UUC) process has been completed in a manner that appears acceptable, based on participation/ confirmation by other responsible parties (utility companies, subcontractor, client, owner, etc.), for the following:</b> |                                                                                                                                                                                    |
| Electric:                                                                                                                                                                                                                                                                                                                                                                              | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Other _____                                               |
| Fuel (gas, petroleum, steam):                                                                                                                                                                                                                                                                                                                                                          | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Other _____                                               |
| Communication:                                                                                                                                                                                                                                                                                                                                                                         | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Other _____                                               |
| Water:                                                                                                                                                                                                                                                                                                                                                                                 | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Other _____                                               |
| Sewer:                                                                                                                                                                                                                                                                                                                                                                                 | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Other _____                                               |
| Other: _____                                                                                                                                                                                                                                                                                                                                                                           | <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Other _____                                                          |
| Comments: GZA to confirm mark outs prior to commencing work. Contractor to determine exact location of test boring.                                                                                                                                                                                                                                                                    |                                                                                                                                                                                    |

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

### 5. HAZARD ASSESSMENT (CHECK ALL THAT APPLY AND ADDRESS EACH HAZARD IN SECTION 6)

#### A. GENERAL FIELDWORK HAZARDS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Confined Space Entry (Add Confined Space Entry Permit)<br><input checked="" type="checkbox"/> Abandoned or vacant building/Enclosed Spaces<br><input checked="" type="checkbox"/> Significant Slip/Trip/Fall Hazards<br><input type="checkbox"/> Unsanitary/Infectious Hazards<br><input type="checkbox"/> Poisonous Plants<br><input checked="" type="checkbox"/> Biting/Stinging Insects<br><input type="checkbox"/> Feral Animal Hazards<br><input type="checkbox"/> Water/Wetlands Hazards<br><input type="checkbox"/> Remote Locations/Navigation/Orientation hazards<br><input type="checkbox"/> Heavy Traffic or Work Alongside a Roadway<br><input checked="" type="checkbox"/> Weather-Related Hazards<br><input checked="" type="checkbox"/> Motor vehicle operation Hazards<br><input checked="" type="checkbox"/> Heavy Equipment Hazards<br><input checked="" type="checkbox"/> Structural Hazards (i.e. unsafe floors/stairways/roof)<br><input type="checkbox"/> Demolition/Renovation<br><input type="checkbox"/> Presence of Pedestrians or the General Public | <input checked="" type="checkbox"/> Overhead Hazards (i.e. falling objects, overhead power lines)<br><input checked="" type="checkbox"/> Portable Hand Tools or Power Tools<br><input checked="" type="checkbox"/> Significant Lifting or Ergonomic Hazards<br><input checked="" type="checkbox"/> Electrical Hazards (i.e. Equipment 120 Volts or Greater, Work Inside Electrical Panels, or Maintenance of Electrical Equipment)<br><input type="checkbox"/> Other Stored energy Hazards (i.e. Equipment with High Pressure or Stored Chemicals)<br><input type="checkbox"/> Fire and/or Explosion Hazard<br><input checked="" type="checkbox"/> Elevated Noise Levels<br><input type="checkbox"/> Excavations/Test Pits<br><input type="checkbox"/> Explosives or Unexploded Ordinance/MEC<br><input type="checkbox"/> Long Distance or Overnight Travel<br><input type="checkbox"/> Personal Security or High Crime Area Hazards<br><input type="checkbox"/> Working Alone<br><input type="checkbox"/> Ionizing Radiation or Non-Ionizing Radiation<br><input checked="" type="checkbox"/> Chemical/Exposure Hazards (See Part B for Details)<br><input checked="" type="checkbox"/> Other: COVID-19, Underground Utilities, Soil Handling |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### B. CHEMICAL/EXPOSURE HAZARDS (CONTAMINANTS ARE CONTAINED IN X SOIL, WATER, X GROUNDWATER)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> No chemical hazards anticipated<br><input type="checkbox"/> Hydrogen Sulfide (H <sub>2</sub> S)<br><input type="checkbox"/> Cyanides, Hydrogen Cyanide (HCN)<br><input type="checkbox"/> Carbon Monoxide<br><input type="checkbox"/> Herbicides, Pesticide, Fungicide, Animal Poisons<br><input checked="" type="checkbox"/> Metals, Metal Compounds:<br><input type="checkbox"/> Corrosives, Acids, Caustics, Strong Irritants<br><input type="checkbox"/> Polychlorinated Biphenyls (PCBs)<br><input checked="" type="checkbox"/> Polycyclic Aromatic Hydrocarbons (PAHs)<br><input type="checkbox"/> Compressed Gases<br><input type="checkbox"/> Flammable/Combustible Liquids<br><input type="checkbox"/> Radiation Hazards (i.e. radioactive sealed/open source, x-rays, ultra violet, infrared, radio-frequency, etc.) | <input type="checkbox"/> Methane<br><input type="checkbox"/> Chemicals Subject to OSHA Hazard Communication (attach Safety Data Sheet for each chemical GZA brings to the site)<br><input type="checkbox"/> Containerized Waste, Chemicals in Piping & Process Equipment<br><input type="checkbox"/> Emissions from Gasoline-, Diesel-, Propane-fired Engine, Heater, Similar Equipment<br><input type="checkbox"/> General Work Site Airborne Dust Hazards<br><input checked="" type="checkbox"/> Volatile Organic Compounds (VOCs), BTEX<br><input checked="" type="checkbox"/> Chlorinated Organic Compounds<br><input checked="" type="checkbox"/> Fuel Oil, Gasoline, Petroleum Products, Waste Oil<br><input type="checkbox"/> Asbestos<br><input type="checkbox"/> Oxygen Deficiency, Asphyxiation Hazards<br><input checked="" type="checkbox"/> Other: Silica |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

### 6. SITE-SPECIFIC OVERVIEW OF H&S HAZARDS/MITIGATIONS (NOTE: Based on Hazard Assessment, Section 5)

Describe the major hazards expected to be present at the jobsite, and describe the safety measures to be implemented for worker protection (refer to items checked in Section 5 above). Use brief abstract statements or more detailed narrative as may be appropriate.

| ON-SITE HAZARDS:                             | HAZARD MITIGATIONS:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Task Hazard Analyses                         | <p>Task 21.1 – General Outdoor Field Work</p> <p>Task 4.1 – Drilling Observations</p> <p>Task 4.5 – Soil-Gas Sampling</p> <p>Task 20.11 – Field Sampling</p> <p>COVID-19</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Owning Zero                                  | Ensure all GZA personnel on-site have downloaded the People Based Safety app to their mobile phones and are familiar with using it to report safety events. Prior to work each day, review Owning Zero rules with all onsite personnel during morning safety meeting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| COVID-19                                     | <p>Check-in daily to the GZA COVID-19 app. Observe social distancing, i.e. stay 6 feet away from others where possible. If exhibiting any symptoms (cough, fever, prolonged shortness of breath), please stay home. Notify PM (Dharmil S. Patel <a href="tel:646-929-8908">646-929-8908</a>) for rescheduling site visits. Wash hands for 20 seconds after touching any shared equipment. The situation is rapidly developing, so keep up to date by checking guidelines from GZA's Pandemic Flu Response Team at:</p> <p>Notify PM for rescheduling site visits.</p> <p>See attached JHA and Follow Client specific work procedures related to Covid19 prevention if applicable</p>                                                                                                                                                                                                   |
| Abandoned or vacant building/Enclosed Spaces | Ask the client to validate that the building is structurally safe to enter. Constantly scan surroundings for integrity of floors and stairs and stay alert to debris on the ground or unsafe objects. Do not walk under ceilings or structures showing signs of distress and wear hard hats at all times within structures. Be alert for other people and / or animals in the building. Bring flashlights in case of poor lighting and a charged cell phone for communication. Inform your PM to let her/him know your anticipated hours of work on the site, and call them when you leave the site for the day. Leave the site if it is unsafe for any reason.                                                                                                                                                                                                                        |
| Biting and Stinging Insects                  | <p>Ticks carry risk of Lyme and other Diseases. Tick season is basically any field day above 40 degrees F. Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks. Check clothing for ticks frequently. Check whole body immediately upon returning from field and shower. Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellent. Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.</p> <p>See attached Policy - GZA policy 03-3019 Lyme Disease.</p>                                                           |
| Slip, Trips, and Falls                       | Inspect work area prior to starting work. Mark out or remove any potential hazards. Be aware and inspect area for uneven surface. Wear sturdy shoes with ankle support and good tread. Look for potential natural depressions/holes/or other obstructions in the area of work and travel. Personnel will be wearing appropriate boots with good tread to prevent slips and falls. Maintain one free hand to break falls. Provide adequate space for each employee to work safely with sound footing. Watch for equipment on ground and slippery surfaces. Keep work area clean, no running, be mindful of changing weather conditions that may change footing conditions. Store any hand tools used for sampling in their proper storage location when not in use. Do not perform work if adequate lighting is not available. Maintain an exit pathway away from the rig at all times. |

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weather-Related Hazards                     | <p>Weather conditions will be assessed prior to on-site work and forecast examined for anticipated period of work. If weather permits fieldwork, then workers will dress appropriately. Should inclement weather be encountered, the project scope may be reduced or rescheduled. Breaks will be taken to reduce exposure to the elements. If conditions change and lightning or thunder is observed, work will be suspended immediately, and workers will seek shelter. Work may resume if thunder and/or lightning cease for 30 minutes. In the case of cold weather, proper warm gear should be worn to minimize cold exposure. Hand warmers (e.g. "Hot Hands") should be used when appropriate to keep extremities warm and multiple breaks within a warm area (vehicle with heat) should be taken. Review the signs of heat stress and dehydration before the start of fieldwork. Water, sunscreen, hardhat, tinted safety sunglasses, rain gear (if necessary) and periodic breaks should all be planned for. Be sure to consume plenty of liquids on hot summer days and stay out of direct sunlight for extended periods of time to the extent possible. Use protective ointments such as sunscreen and chap stick, and consult the OSHA Heat Safety App daily.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Motor Vehicle Operation Hazard              | <p>Check blind spots before backing up. Use a spotter when maneuvering vehicle in tight locations. Obey speed limits and wear seatbelts. No active hand-held or hands-free cell phone use while driving.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Underground Utilities                       | <p>Confirm that underground utility clearance procedures have been completed in accordance with GZA Policy # 04-0301 Responsibility for Utility Clearance of Exploration Locations for clearing utility locations prior to breaking ground. Hand clear as necessary prior to commencement of drilling activities.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Heavy Equipment Hazards                     | <p>All personnel working in proximity to heavy equipment will be familiarized with the locations and operations of emergency kill switches prior to equipment start-up. A first-aid kit and fire extinguisher (10 # Class B/C, minimum) will be available at all times. No loose clothing, jewelry, or unsecured long hair is permitted near the rig. Keep hands and feet away from all moving parts while drilling is in-progress. Persons shall not pass under or over a moving drill tools. Watch for moving vehicles and equipment. Stay out of equipment radius while drilling and excavation is in-progress. Maintain visibility and eye contact with operators when walking around trucks and excavators. Wear reflective vests to enhance visibility.</p> <p>Stay clear of drill rig or excavator (minimum of 6 feet) while operating and do not approach unless equipment has been stopped and eye contact/coordination is made with equipment operator for personnel to approach rig to make observations or collect samples. GZA personnel shall not climb onto or approach rig or excavator while operating or while drill rods are being attached or removed. GZA staff should verify that the onsite equipment has been routinely inspected. GZA staff should also maintain a safe working distance from the equipment while it is maneuvering around the site.</p> <p>GZA staff are not authorized to operate the drill rig or excavator, however, they should be familiar with the location and operation of the emergency shutoff in the event the main operator is unable to operate this control in the event of an emergency.</p> <p>Personnel are not allowed on a mast while drilling is in operation. While a drill rig or excavator is moved from one location to another, drill steel, tools, and other equipment shall be secured and the mast placed in a safe position. All borings and test pits will be adequately covered and/or barricaded if left unattended for any period of time to prevent injury.</p> <p>Working around heavy equipment, personnel shall be aware of pinch points, rotating equipment, and winch operated equipment. Maintain safe working distance and never walk underneath overhead projection of the equipment. Always maintain eye contact and communication with the operator. Follow GZA safe drilling and field work procedures.</p> |
| Struck by, caught by, run over by equipment | <p>Do not stand near or where equipment operators cannot see you. Always be in line of sight. Do not make sudden moves and always let the operator know of your intentions. Wear high-visibility safety vest, hard hat, eye protection, steel toe boots and use common sense and good housekeeping practices to avoid injury. Stay within sight of rig/excavator operator but at least 6-10 feet away from rig and excavator swing area. Maintain clear lines of communication (verbal and/or visual) with the operator. Stand clear of exhaust from operating equipment and stay out of the swing radius of heavy equipment. Be aware of overhead equipment and potential for falling objects (i.e. tree branches). Avoid any "pinch points" where one could become trapped between the equipment and other objects. Maintain awareness of general rig movement/operation and communication with drill crew. Do not conduct soil classification/sampling directly adjacent to the drill rig.</p> <p>Hearing protection shall be worn when working near operating equipment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

|                                                               | Equipment should be situated so that at full extension of bucket arm, the equipment is at least 10 feet away from overhead lines.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------|--------|----|--------|----|--------|----|--------|----|--------|-----|-------------|-----|--------|-----|-----------|-----|------------------|-----|
| Overhead Hazards (i.e. Falling Objects, Overhead Power Lines) | Mechanical raising and falling weights and equipment are typical around drill rig. Stand clear of drill rig when possible. Observe proposed exploration locations for possible overhead utility lines/tree branches and avoid these if applicable. Check for overhead lines at each work location and between locations and keep equipment at least 25 feet from overhead utilities. Wear steel toed boots, hardhat and safety glasses/goggles. If stacked materials appear unstable inform the site representative. Be aware while equipment is advancing into soil / sediment. Do not stand directly in immediate vicinity of equipment in case equipment malfunction occurs. Maintain safe working distance and maintain eye contact and communication with operator. Never stand under elevated loads or equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| Significant Lifting or Ergonomic Hazards                      | Proper lifting techniques (lifting with the legs, carrying the load at a reasonable height to allow for proper posture during the carry, and avoiding twisting while carrying loads) should be followed at all times. Caution should be used when lifting equipment. Be aware of hand position during all stages of the lift, transport and placement of equipment. Review equipment to be moved prior to lifting to prevent moving parts from crushing fingers or otherwise pinching skin. Do not stack items prior to carrying, but rather transport one item at a time to prevent shifting during carrying. Follow GZA Safe Lifting SOP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| Elevated Noise Levels                                         | <p>Always use ear protection when drill rig is in operation.</p> <p>In accordance with 29 CFR 1910.95(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.</p> <p>TABLE G-16 - PERMISSIBLE NOISE EXPOSURES (1)</p> <table border="1"> <thead> <tr> <th>Duration per day (hours)</th><th>Sound level dBA slow response</th></tr> </thead> <tbody> <tr><td>8.....</td><td>90</td></tr> <tr><td>6.....</td><td>92</td></tr> <tr><td>4.....</td><td>95</td></tr> <tr><td>3.....</td><td>97</td></tr> <tr><td>2.....</td><td>100</td></tr> <tr><td>1 1/2 .....</td><td>102</td></tr> <tr><td>1.....</td><td>105</td></tr> <tr><td>1/2 .....</td><td>110</td></tr> <tr><td>1/4 or less.....</td><td>115</td></tr> </tbody> </table> <p>Hearing protection in the form of disposable ear plugs will be worn during field work with sound levels anticipated above those listed in Table G-16. Use sound meter app on phone to assess required PPE. Be aware that hearing protection can diminish warning sounds - do not stand with back to operating equipment and be alert for changing conditions.</p> | Duration per day (hours) | Sound level dBA slow response | 8..... | 90 | 6..... | 92 | 4..... | 95 | 3..... | 97 | 2..... | 100 | 1 1/2 ..... | 102 | 1..... | 105 | 1/2 ..... | 110 | 1/4 or less..... | 115 |
| Duration per day (hours)                                      | Sound level dBA slow response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 8.....                                                        | 90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 6.....                                                        | 92                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 4.....                                                        | 95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 3.....                                                        | 97                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 2.....                                                        | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 1 1/2 .....                                                   | 102                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 1.....                                                        | 105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 1/2 .....                                                     | 110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| 1/4 or less.....                                              | 115                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| Soil Handling                                                 | Be aware that soil jars may have been broken during transport and properly cushion sample jars to prevent breakage. Do not eat, smoke or apply cosmetics (e.g. Chapstick, sunscreen) in the work area. Wear nitrile gloves during sampling to avoid common hazards associated with soil handling. Do not have skin contact with/ingest soils. Wash hands and face before eating or drinking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| Portable Hand Tools                                           | Appropriate personal protective equipment (i.e.: safety glasses, face shield, safety goggles, gloves, etc.) shall be worn to protect from hazards that may be encountered while using portable power tools and hand tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |
| Silica Dust                                                   | Primary health effects of silica exposure include silicosis. Training will be provided to employees potentially exposed over the PEL for silica prior to them beginning work with silica, and will be updated on a regular basis. Depending on the levels of total and/or respirable dust in the employee's breathing zone, air monitoring will be performed for particulates. Ample ventilation will be provided to GZA workers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                          |                               |        |    |        |    |        |    |        |    |        |     |             |     |        |     |           |     |                  |     |

**7. AIR MONITORING ACTION LEVELS – Make sure air monitoring instruments are in working order, calibrated before use, and ‘bump-checked’ periodically throughout the day and/or over multiple days of use**

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

|                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Is air monitoring to be performed for this project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>                                                                                                                              |                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>ACTION LEVELS FOR OXYGEN DEFICIENCY AND EXPLOSIVE ATMOSPHERIC HAZARDS (Action levels apply to occupied work space in general work area)</b><br><input type="checkbox"/> Applicable, See Below. <input checked="" type="checkbox"/> Not Applicable |                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Parameter                                                                                                                                                                                                                                            | Response Actions for Elevated Airborne Hazards                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Oxygen                                                                                                                                                                                                                                               | At 19.5% or below – Exit area, provide adequate ventilation, or proceed to Level B, or discontinue activities<br>Verify presence of adequate oxygen (approx. 12% or more) before taking readings with LEL meter.<br>Note: If oxygen levels are below 12%, LEL meter readings are not valid.                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| LEL                                                                                                                                                                                                                                                  | Less than 10% LEL – Continue working, continue to monitor LEL levels<br>Greater than or Equal to 10% LEL – Discontinue work operations and immediately withdraw from area.<br>Resume work activities ONLY after LEL readings have been reduced to less than 10% through passive dissipation, or through active vapor control measures. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>ACTION LEVELS FOR INHALATION OF TOXIC/HAZARDOUS SUBSTANCES (Action levels are for sustained breathing zone concentrations)</b><br><input checked="" type="checkbox"/> Applicable, See Below. <input type="checkbox"/> Not Applicable              |                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Air Quality Parameters<br>(Check all that apply)                                                                                                                                                                                                     | Remain in Level D<br>or Modified D                                                                                                                                                                                                                                                                                                     | Response Actions for Elevated Airborne Hazards                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <input checked="" type="checkbox"/> VOCs                                                                                                                                                                                                             | 0 to 5 ppm                                                                                                                                                                                                                                                                                                                             | From 5 ppm to 10 ppm: Proceed to Level C, or Ventilate, or Discontinue Activities<br>If greater than 5 ppm: Discontinue Activities and consult EHS Team                                                                                                                                                                                                                                                                                                                     |
| <input type="checkbox"/> Carbon Monoxide                                                                                                                                                                                                             | 0 to 35 ppm                                                                                                                                                                                                                                                                                                                            | At greater than 35 ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities.                                                                                                                                                                                                                                                                                                                                                             |
| <input type="checkbox"/> Hydrogen Sulfide                                                                                                                                                                                                            | 0 to 10 ppm                                                                                                                                                                                                                                                                                                                            | At greater than 10 ppm, exit area, provide adequate ventilation, proceed to Level B, or discontinue activities                                                                                                                                                                                                                                                                                                                                                              |
| <input checked="" type="checkbox"/> Dust                                                                                                                                                                                                             | 0 to 150 ug/m <sup>3</sup>                                                                                                                                                                                                                                                                                                             | If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m <sup>3</sup> above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m <sup>3</sup> of the upwind level and in preventing visible dust migration |
| <input type="checkbox"/>                                                                                                                                                                                                                             | 0 to                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>SPECIAL INSTRUCTIONS/COMMENTS REGARDING AIR MONITORING (IF APPLICABLE)</b><br><br>                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

### 8. HEALTH AND SAFETY EQUIPMENT AND CONTROLS

#### AIR MONITORING INSTRUMENTS

- ☒ PID Type: Lamp Energy: 10.6 eV  
☐ FID Type:  
☐ Carbon Monoxide Meter  
☐ Hydrogen Sulfide Meter  
☐ O<sub>2</sub>/LEL Meter  
☒ Particulate (Dust) Meter  
☒ Calibration Gas Type - Isobutylene  
☐ Others:

#### OTHER H&S EQUIPMENT & GEAR

#### PERSONAL PROTECTIVE EQUIPMENT

- ☐ Respirator – Type  
☐ Respirator - Cartridge Type:  
☒ Hardhat  
☒ Outer Gloves Type: Nitrile  
☒ Inner Gloves Type: nitrile  
☒ Steel-toed boots/shoes  
☐ Coveralls – Type  
☐ Outer Boots – Type  
☒ Eye Protection with side shields  
☐ Face Shield

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Fire Extinguisher<br><input checked="" type="checkbox"/> Caution Tape<br><input checked="" type="checkbox"/> Traffic Cones or Stanchions<br><input type="checkbox"/> Warning Signs or Placards<br><input type="checkbox"/> Decon Buckets, Brushes, etc.<br><input type="checkbox"/> Portable Ground Fault Interrupter (GFI)<br><input type="checkbox"/> Lockout/Tagout Equipment<br><input type="checkbox"/> Ventilation Equipment<br><input checked="" type="checkbox"/> Others: First Aid Kit, Cell Phone, Water, Soap | <input checked="" type="checkbox"/> Traffic Vest<br><input type="checkbox"/> Personal Flotation Device (PFD)<br><input type="checkbox"/> Fire Retardant Clothing<br><input type="checkbox"/> EH (Electrical Hazard) Rated Boots, Gloves, etc.<br><input checked="" type="checkbox"/> Noise/Hearing Protection<br><input checked="" type="checkbox"/> Others: Face Covering (COVID—19)<br><b>Discuss/Clarify, as Appropriate:</b> face mask covering when social distancing cannot be readily practiced |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 9. H&S TRAINING/QUALIFICATIONS FOR FIELD PERSONNEL

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Project-Specific H&S Orientation (Required for All Projects/Staff)<br><input checked="" type="checkbox"/> OSHA 40-Hour HAZWOPER/8 Hour Refreshers<br><input type="checkbox"/> Hazard Communication (for project-specific chemical products)<br><input checked="" type="checkbox"/> First Aid/CPR (required for HAZWOPER for at least one individual on site)<br><input type="checkbox"/> Current Medical Clearance Letter (required for HAZWOPER)<br><input checked="" type="checkbox"/> OSHA 10-hour Construction Safety Training<br><input type="checkbox"/> Fall Protection Training<br><input type="checkbox"/> Trenching & Excavation | <input type="checkbox"/> Lockout/Tagout Training<br><input type="checkbox"/> Electrical Safety Training<br><input type="checkbox"/> Bloodborne Pathogen Training<br><input checked="" type="checkbox"/> Safe Drilling SOP<br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Discuss/Clarify, as needed:**

### 10. PERSONNEL AND EQUIPMENT DECONTAMINATION (SECTION ONLY REQUIRED FOR HAZWOPER SITES)

|                                                                                                                   |                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Describe personnel decontamination procedures for the project site, including "dry decon" (simple removal of PPE) | Dry Decon, wash hands and other exposed skin before taking breaks or leaving site. Change PPE before leaving site. |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

| 11. PROJECT PERSONNEL - ROLES AND RESPONSIBILITIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                             |                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------|
| <b>GZA ON-SITE PERSONNEL:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                                              |
| Name(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Project Title/Assigned Role | Telephone Numbers                            |
| Mark Hutson                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Site Supervisor             | Work: 212-594-8140<br>Cell: 332-208-2260     |
| TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Field Safety Officer        | Work: 212-594-8140<br>Cell:                  |
| TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | First Aid Personnel         | Work: 212-594-8140<br>Cell:                  |
| TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | GZA Project Team Members    | Work: 212-594-8140<br>Cell:                  |
| <p><b>Site Supervisors and Project Managers (SS/PM):</b> Responsibility for compliance with GZA Health and Safety programs, policies, procedures and applicable laws and regulations is shared by all GZA management and supervisory personnel. This includes the need for effective oversight and supervision of project staff necessary to control the Health and Safety aspects of GZA on-site activities.</p> <p><b>Field Safety Officer (FSO):</b> The FSO is responsible for implementation of the Site Specific Health and Safety Plan.</p> <p><b>First Aid Personnel:</b> At least one individual designated by GZA who has current training and certification in basic first aid and cardiopulmonary resuscitation (CPR) must be present during on-site activities involving multiple GZA personnel at HAZWOPER sites.</p> <p><b>GZA Project Team:</b> Follow instructions relayed by the HASP and GZA manager on-site.</p> |                             |                                              |
| <b>OTHER PROJECT PERSONNEL:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                             |                                              |
| Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Project Title/Assigned Role | Telephone Numbers                            |
| Victoria D. Whelan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Principal-in-Charge         | Work: (212) 594-8140<br>Cell: (631) 793-8821 |
| Mark Hutson                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Project Manager             | Work: (212) 594-8140<br>Cell: (332) 208-2260 |
| Reinbill Maniquez                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Office Safety Coordinator   | Work: (212) 594-8140<br>Cell: (347) 443-1059 |
| Richard Ecord                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | GZA EHS Director            | Work: 781-278-3809<br>Cell: 404-234-2834     |
| <p><b>Principal-in-Charge:</b> Responsible of overall project oversight, including responsibility for Health and Safety.</p> <p><b>Project Manager:</b> Responsible for day-to-day project management, including Health and Safety.</p> <p><b>Health and Safety Coordinator:</b> General Health and Safety guidance and assistance.</p> <p><b>GZA EHS Director:</b> H &amp;S technical and regulatory guidance, assistance regarding GZA H&amp;S policies and procedures.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                             |                                              |

## GZA SITE-SPECIFIC HEALTH, SAFETY & ACCIDENT PREVENTION STANDARD-PLAN

### 12. PLAN ACKNOWLEDGEMENT AND APPROVALS

#### GZA Project Site Worker Plan Acknowledgement

*I have read, understood, and agree to abide by the information set forth in this Safety and Accident Prevention Plan. I will follow guidance in this plan and in the GZA Health and Safety Program Manual. I understand the training and medical monitoring requirements covered by the work outlined in this plan and have met those requirements.*

| GZA Employee Name | GZA Employee Signature | Date |
|-------------------|------------------------|------|
|                   |                        |      |
|                   |                        |      |
|                   |                        |      |

#### Subcontractor Site Worker Plan Acknowledgement

*GZA has prepared this plan solely for the purpose of protecting the health and safety of GZA employees. Subcontractors, visitors, and others at the site must refer to their organization's health and safety program or site-specific HASP for their protection. Subcontractor employees may use this plan for general informational purposes only. Subcontractor firms are obligated to comply with safety regulations applicable to their work, and understand this plan covers GZA activities only.*

| Subcontractor Employee Name | Subcontractor Employee Signatures | Date |
|-----------------------------|-----------------------------------|------|
|                             |                                   |      |
|                             |                                   |      |
|                             |                                   |      |

#### GZA HASP Approval Signatures

*The following individuals indicate their acknowledgement and/or approval of the contents of this Site Specific H&S Plan based on their understanding of project work activities, associated hazards and the appropriateness of health and safety measures to be implemented. A signed copy of this document must be present at the project site at all times work is being performed.*

| GZA Author/Reviewer Role                                | Signature | Date |
|---------------------------------------------------------|-----------|------|
| <b>Mark Hutosn</b><br><b>HASP Preparer</b>              |           |      |
| <b>TBD</b><br><b>EHS Reviewer</b>                       |           |      |
| <b>Victoria D. Whelan</b><br><b>Principal in Charge</b> |           |      |



## **ATTACHMENTS**

|                |                                                    |
|----------------|----------------------------------------------------|
| ATTACHMENT - A | HEALTH AND SAFETY BRIEFING/SITE ORIENTATION RECORD |
| ATTACHMENT - B | DIRECTIONS TO HOSPITAL                             |
| ATTACHMENT - C | JOB HAZARD ANALYSES                                |
| ATTACHMENT - D | ACCIDENT AND INJURY REPORT FORM                    |
| ATTACHMENT - E | SAFETY DATA SHEETS                                 |
| ATTACHMENT – F | PREFERRED HASP – FEBRUARY 2024                     |



**ATTACHMENT - A**  
**HEALTH AND SAFETY BRIEFING**



## Health and Safety Briefing/Site Orientation Record/Hazard Communication

This is to verify that I, the undersigned, have been provided with a site (orientation) briefing, including hazard communication, regarding the safety and health considerations at the 1701 Purdy Street, Bronx, New York (Site). I agree to abide by my employer's Site-specific safety and health plan and other safety or health requirements applicable to the Site.

| Name (Print) | Signature | Company | Date |
|--------------|-----------|---------|------|
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |
|              |           |         |      |

Site (orientation) briefing conducted by: \_\_\_\_\_

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

Health and Safety Briefing/Site Orientation Record



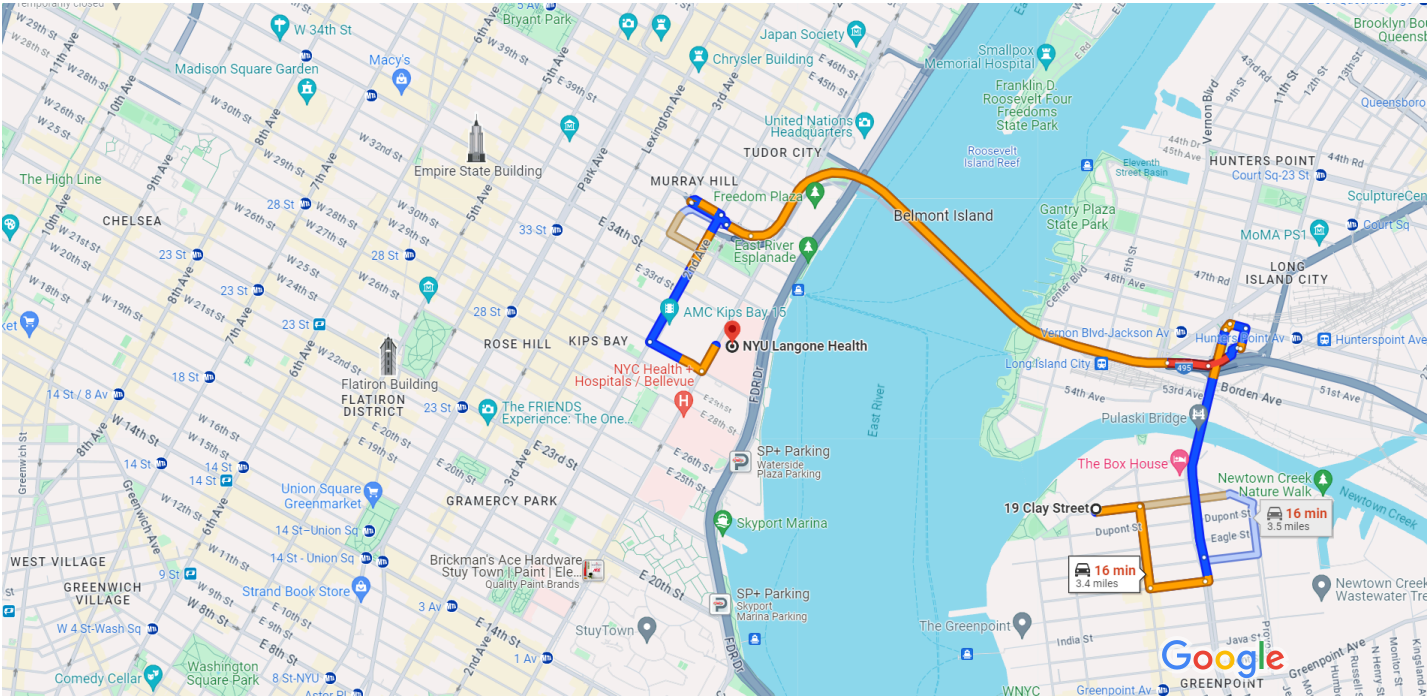


**ATTACHMENT - B  
ROUTE TO HOSPITAL**

Google Maps

19 Clay St, Brooklyn, NY 11222 to NYU Langone Health

Drive 3.4 miles, 16 min



Map data ©2024 Google 1000 ft

19 Clay St  
Brooklyn, NY 11222

⚠️ This route has tolls.

Take Manhattan Ave to McGuinness Blvd

- 3 min (0.4 mi)
- ↑

1. Head east on Clay St toward Manhattan Ave

0.1 mi
- ↘

2. Turn right at the 1st cross street onto Manhattan Ave

0.2 mi
- ↙

3. Turn left onto Green St

0.1 mi

Take Pulaski Brg, Queens–Midtown Tunn and 2nd Ave to 1st Ave. in Manhattan

- 10 min (3.0 mi)
- ↙

4. Turn left at the 1st cross street onto McGuinness Blvd

348 ft
- ↙

5. Use the right lane to continue on Pulaski Brg

0.6 mi
- ↗

6. Slight right toward 49th Ave

95 ft

- 7. Turn right onto 49th Ave  
203 ft
- 8. Turn right onto 11th Pl  
259 ft
- 9. Turn right onto 50th Ave  
46 ft
- ↶ 10. Turn left toward I-495 W  
⚠ Toll road  
456 ft
- ⬆ 11. Merge onto I-495 W  
⚠ Toll road  
0.1 mi
- ⬆ 12. Continue onto Queens–Midtown Tunnel  
⚠ Toll road  
1.2 mi
- ⬆ 13. Continue onto I-495 W/Queens–Midtown Tunnel  
⚠ Toll road  
338 ft
- 14. Take the exit toward Uptown/3 Ave/38 St/41 St  
⚠ Toll road  
0.1 mi
- ⬆ 15. Take the ramp to 39th St  
⚠ Toll road  
16 ft
- 16. Turn right onto E 37th St  
433 ft
- 17. Turn right onto 2nd Ave  
0.3 mi
- ↶ 18. Turn left onto E 30th St  
0.1 mi
- ↶ 19. Use the left 2 lanes to turn left onto 1st Ave.  
367 ft

NYU Langone Health

550 1st Ave., New York, NY 10016



**ATTACHMENT - C**  
**JOB HAZARD ANALYSES**



## GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling**

**Analysis By: Andrew Whitsitt**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: October 2, 2011**

**Date: June 14, 2012**

**Date: June 26, 2012**

**Revised: June 14, 2012**

### Task 4.1

## DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                                                                                              | Potential Hazards                                            | Controls                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>Review Related THA's –</u><br>21.1 – General Outdoor Field Work                                         |                                                              |                                                                                                                                                                                                     |
| Observation of Deploying of Traffic Protection Equipment by Drilling Contractor (e.g., cones, signs, etc.) | Personal injury due to vehicle traffic, Collisions, injuries | Wear high visibility vest at all times when out of vehicle.                                                                                                                                         |
|                                                                                                            |                                                              | Park in designated parking locations or select off-road areas that are firm and free of hazards. Directly inspect parking location on foot if necessary.                                            |
|                                                                                                            |                                                              | Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle and/or equipment.                                        |
|                                                                                                            |                                                              | If parking outside of a designated parking area, demarcate vehicle with traffic cones or equivalent.                                                                                                |
|                                                                                                            |                                                              | Use emergency flashers or other appropriate vehicle warning system when placing equipment.                                                                                                          |
|                                                                                                            |                                                              | Observe if police detail or other required traffic control system (if necessary) is in place.                                                                                                       |
|                                                                                                            |                                                              | Stay within the confines of the work area and do not venture outside of the demarcated work area into traffic.                                                                                      |
|                                                                                                            |                                                              | If you observe that contractor may back into structures, vehicles, fences, etc., notify contractor immediately with pre-determined signals. Do not cross the path of the heavy equipment.           |
| Observation of Mobilizing Drill Rig To Job Site and positioning at borehole by Drilling Contractor         | Struck by drill rig                                          | Stand clear of moving Drill Rig.                                                                                                                                                                    |
|                                                                                                            |                                                              | Before drilling begins, confirm that drill rig has been parked properly and securely by the drilling contractor.                                                                                    |
|                                                                                                            |                                                              | Wear high visibility vests. Make sure that the driver can see you and is aware of your location at all times.                                                                                       |
|                                                                                                            |                                                              | Inform the driller if it is observed that the rig is being moved with the mast raised and/or tools and other equipment on the rig are not secured and can fall over and potentially hurt personnel. |



## GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling

Analysis By: Andrew Whitsitt

Reviewed By: Guy Dalton

Approved By: Jayanti Chatterjee , CIH

Date: October 2, 2011

Date: June 14, 2012

Date: June 26, 2012

Revised: June 14, 2012

### Task 4.1

## DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                                                        | Potential Hazards                                     | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | Overhead utility                                      | Look overhead to assess if any utilities are present and confirm with driller that they are aware of the overhead utility location and to take appropriate actions to prevent contact with the overhead utilities and to minimize any arc flash hazards. Review GZA's Electrical Safe Work Practices Program 03-3003.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Observation of drilling operations and monitoring well installations | Underground utilities                                 | Confirm that underground utility clearance procedures have been completed in accordance with GZA Policy # 04-0301 <i>Responsibility for Utility Clearance of Exploration Locations</i> for clearing utility locations prior                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                      | Moving machinery, rotating parts, cables, ropes, etc. | <p>Do not wear loose fitting clothing.</p> <p><b>All GZA personnel working in proximity to a drill rig will be familiarized with the location and operation of emergency kill switches prior to equipment start-up.</b> Maintain safe distance from rotating auger, drill casing, rods and cathead at all times. Observe operations from a safe distance. Persons shall not pass under or over a moving stem or auger. Check that "kill" switches are present and working. Confirm with driller that daily inspection of rig has been performed prior to commencing work and no conditions were noted with the rig that would affect its proper operation.</p> <p>Do not touch or operate or assist with any rig operations and maintenance work.</p> <p>Make eye contact with operator before approaching equipment.</p> <p>Be alert and take proper precautions regarding slippery ground surfaces and similar hazards near rotating auger.</p> <p>Do not engage the driller or helper when drill is in operation. Work out prearranged signals to get their attention before approaching them.</p> <p>Confirm prior to drilling operations that driller and helper communicate and coordinate their actions and movements.</p> <p>GZA personnel are not allowed to be on the drill rig or operate a rig.</p> |



## GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling**

**Analysis By: Andrew Whitsitt    Reviewed By: Guy Dalton    Approved By: Jayanti Chatterjee , CIH**

**Date: October 2, 2011  
Revised: June 14, 2012**

**Date: June 14, 2012**

**Date: June 26, 2012**

### Task 4.1

## DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards                                                       | Controls                                                                                                                                                                                |
|---------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                                                         | Wear steel toed boots, hardhat and side-shielding safety glasses/goggles.                                                                                                               |
|               | Falling objects, debris                                                 | Stand clear of stacked drill rods. If stack appears unstable inform driller.                                                                                                            |
|               | Noise                                                                   | Wear appropriate hearing protection.                                                                                                                                                    |
|               | Roadway/traffic hazards                                                 | Be alert at all times; never step outside traffic cones.                                                                                                                                |
|               |                                                                         | Wear high visibility vests at all times.                                                                                                                                                |
|               |                                                                         | Be familiar with escape routes at each location.                                                                                                                                        |
|               |                                                                         | Follow project Traffic Control Plan. Be alert at all times and never step outside the traffic cones.                                                                                    |
|               |                                                                         | Use a Police detail when necessary.                                                                                                                                                     |
|               | Slips, trips and falls                                                  | Maintain clean and sanitary work area free of tripping/slipping hazards.                                                                                                                |
|               |                                                                         | All borings, excavations, or partially completed groundwater monitoring wells will be adequately covered and/or barricaded if left unattended for any period of time to prevent injury. |
|               |                                                                         | Store any hand tools used for sampling in their proper storage location when not in use.                                                                                                |
|               |                                                                         | Provide adequate space for each employee to work safely with sound footing.                                                                                                             |
|               |                                                                         | Do not perform work if adequate lighting is not available.                                                                                                                              |
|               |                                                                         | Maintain an exit pathway away from the rig at all times.                                                                                                                                |
|               | Cuts, bruises, shocks, lacerations, sprains and strains during tool use | When working with a driller, do not assist the drilling crew with their work.                                                                                                           |
|               |                                                                         | Use properly maintained tools; do not use damaged tools.                                                                                                                                |
|               |                                                                         | Wear the proper Personal Protective Equipment based on the task being performed.                                                                                                        |
|               |                                                                         | Store and carry tools correctly.                                                                                                                                                        |
|               |                                                                         | Use the correct tool for the job.                                                                                                                                                       |
|               |                                                                         | Do not use electrical tools with damaged cords or other electrical components.                                                                                                          |
|               |                                                                         | Observe proper electrical safety practices. Do not use electrical tools in wet areas.                                                                                                   |



## GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling**

**Analysis By: Andrew Whitsitt**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: October 2, 2011**

**Date: June 14, 2012**

**Date: June 26, 2012**

**Revised: June 14, 2012**

### Task 4.1

## DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards                          | Controls                                                                                                                                                                                                                                                 |
|---------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                            | Coordinate activities with driller. Allow driller to open sampling equipment (i.e., split spoons, Geoprobe sleeves, etc.)                                                                                                                                |
|               | Fire hazards                               | Be familiar with emergency procedures and where fire extinguishers are present on site.                                                                                                                                                                  |
|               |                                            | Inform GZA subcontractor if you observe improper storage of used rags and unsafe storage of flammable/combustible liquids brought on site.                                                                                                               |
|               |                                            | GZA and its subcontractors, suppliers and vendors shall not smoke in the work area in GZA project sites.                                                                                                                                                 |
|               |                                            | Smoking can only be in designated smoking areas away from work areas and potential fire hazard locations.                                                                                                                                                |
|               |                                            | Confirm with driller that a fire extinguisher present with rig and will be available at all times and that inspection tag is not expired.                                                                                                                |
|               |                                            | If driller is welding or cutting on site confirm there are no flammables or combustible materials near the vicinity of welding machines or torches (such as debris, fuels, grass/weeds, etc.). Review Site requirements for obtaining "Hot Work Permit". |
|               |                                            | Stand well clear of welding/cutting/burning areas.                                                                                                                                                                                                       |
|               | Exposure to Hazardous Substances/Chemicals | When drilling activities encounter the presence of gas or electric, the drill crew shall immediately curtail drilling activity, shut down the drill rig and contact the Project Manager.                                                                 |
|               |                                            | Become familiar with hazards associated with hazardous commercial products used in drilling (fuels, silica sand, grout, cement, bentonite, etc.). Review Safety Data Sheets (SDSs) for such products and participate in daily safety tailgate meetings.  |
|               |                                            | Do not handle drilling chemicals.                                                                                                                                                                                                                        |
|               |                                            | Wear appropriate personal protective equipment.                                                                                                                                                                                                          |
|               |                                            | Review hazards of chemicals that may have been used or currently are being used on site.                                                                                                                                                                 |
|               |                                            | Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.                                                                                                                                                |





## GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: Drilling Observations, Monitoring Well Installation Observation and Soil Sampling**

**Analysis By: Andrew Whitsitt**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: October 2, 2011**

**Date: June 14, 2012**

**Date: June 26, 2012**

**Revised: June 14, 2012**

### Task 4.1

## DRILLING OBSERVATIONS, MONITORING WELL INSTALLATION OBSERVATIONS, SOIL SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards     | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                       | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Assess whether procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate air monitoring, personal protective clothing and respiratory protection, as needed. If contamination is identified at the Site only personnel trained and medically qualified to work on hazardous sites will be permitted to proceed with the work.                         |
| Sampling Soil | Exposure to chemicals | <div>Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.</div> <div>Understand potential hazards associated with handling sample collection preservatives.</div> <div>Review and have SDS available for chemicals being brought on site, including that of sample preservatives.</div> <div>Wear appropriate PPE identified in the HASP</div> <div>Wash hands before eating and drinking. Eating and drinking are prohibited in areas of soil contamination/work area.</div> |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                     |                                              |                                                                 |
|-------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Job: Groundwater Sampling</b>    |                                              |                                                                 |
| <b>Analysis By: Andrew Whitsitt</b> | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH</b> |
| <b>Date: September 30, 2011</b>     | <b>Date: November 9, 2011</b>                | <b>Date: December 9, 2011</b>                                   |

## TASK 4.2 GROUNDWATER SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                          | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Deploying Traffic Protection Equipment | Personal injury due to vehicle traffic; Collisions, injuries     | All drivers shall be properly licensed. Abide by driving safety procedures. Inspect vehicle to ensure it is in safe operating condition.                                                                                                                                                                                                                                                                           |
|                                        |                                                                  | Park in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.                                                                                                                                                                                                                                                           |
|                                        |                                                                  | Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions.                                                                                                                                                                                                                                                                                                             |
|                                        |                                                                  | Utilize police detail (if present) to direct traffic while entering traffic safety zone, if applicable.                                                                                                                                                                                                                                                                                                            |
| Working outdoors                       | Unescorted or vacant site /Working Alone                         | Do not assume that Site has been maintained for safety.                                                                                                                                                                                                                                                                                                                                                            |
|                                        |                                                                  | Coordinate site visit with other personnel not present, so that your failure to return would be noticed. Sign out or call into the office to leave site specific information where you are working, the anticipated duration/hours of work on site. Do this for each site if multiple in one day. See GZA working alone policy.                                                                                    |
|                                        | Hunters, Abutters, and Property Owners                           | Always wear high visibility safety vest and hat. Make deliberate noise                                                                                                                                                                                                                                                                                                                                             |
|                                        |                                                                  | Permission for field work on private and public lands must almost always be obtained in advance. When possible, contact the local landowners when on site.                                                                                                                                                                                                                                                         |
|                                        |                                                                  | Leave the site immediately if threatened or made to feel uncomfortable.                                                                                                                                                                                                                                                                                                                                            |
|                                        |                                                                  | Always announce yourself and your business at the site.                                                                                                                                                                                                                                                                                                                                                            |
|                                        |                                                                  | Leave the site immediately if threatened or made to feel uncomfortable.                                                                                                                                                                                                                                                                                                                                            |
|                                        |                                                                  | Understand local hunting seasons and requirements.                                                                                                                                                                                                                                                                                                                                                                 |
|                                        | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F. <ul style="list-style-type: none"><li>• Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li><li>• Check clothing for ticks frequently</li><li>• Check whole body immediately upon returning from field and shower.</li></ul> |
|                                        |                                                                  | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                                                                                                                                                                |
|                                        |                                                                  | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellant.                                                                                                                                                                                      |

## TASK 4.2

### GROUNDWATER SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks                          | Potential Hazards                             | Controls                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                                               | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                                                                                                                                                                                    |
|                                        |                                               | Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.                                                                                                                                                                                                          |
|                                        | Exposure to Hazardous Substances              | Become familiar with the hazards associated with hazardous commercial products used while groundwater sampling (laboratory preservatives, decontamination solutions, etc.). Review MSDS for such products.                                                                                                                                                                                                                       |
|                                        |                                               | Wear proper personal protective equipment (PPE) as specified in the Health and Safety Plan (HASP) to avoid direct contact with Site contaminants, calibration solutions, decontamination supplies, and laboratory preservatives.                                                                                                                                                                                                 |
|                                        |                                               | Assure proper respiratory protection is available as specified by the HASP.                                                                                                                                                                                                                                                                                                                                                      |
|                                        | Emergency conditions                          | Assure decontamination procedures are in place per the HASP.                                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                               | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                           |
|                                        |                                               | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                              |
|                                        | Adverse Weather Conditions                    | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                             |
|                                        |                                               | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                                                                                                                             |
| Handling Flammable Liquids             | Fire Hazards                                  | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                                    |
|                                        |                                               | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                                               |
|                                        |                                               | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed. |
|                                        |                                               | Use only approved fuel containers for fuel, heavy duty metal cans with stable base and self closing nozzle is recommended.                                                                                                                                                                                                                                                                                                       |
| Mobilizing Equipment                   | Collision; struck by                          | Store flammable liquids in an appropriate area when not in use.                                                                                                                                                                                                                                                                                                                                                                  |
|                                        |                                               | Provide proper fire extinguisher with the sampling equipment.                                                                                                                                                                                                                                                                                                                                                                    |
|                                        |                                               | Observe GZA's "no smoking" policy at all work sites.                                                                                                                                                                                                                                                                                                                                                                             |
|                                        |                                               | Perform a pre-operation check of the vehicle, ensuring service brakes, parking brake, steering, lights, tires, horn, wipers mirrors, and glass are in good condition. Ensure that the vehicle is roadworthy.                                                                                                                                                                                                                     |
|                                        |                                               | All vehicle occupants shall wear seat belts.                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                               | Secure loose materials in the cab or bed of the vehicle.                                                                                                                                                                                                                                                                                                                                                                         |
| Positioning vehicle at monitoring well | Unstable, uneven terrain and ground obstacles | Keep the windows and lights clean.                                                                                                                                                                                                                                                                                                                                                                                               |
|                                        |                                               | Do not operate the vehicle if it is in an unsafe condition.                                                                                                                                                                                                                                                                                                                                                                      |
|                                        |                                               | Abide by driving safety procedures and laws.                                                                                                                                                                                                                                                                                                                                                                                     |
|                                        | Backing Collisions                            | Locate the vehicle on stable ground.                                                                                                                                                                                                                                                                                                                                                                                             |
|                                        |                                               | Avoid wet areas/mud when possible.                                                                                                                                                                                                                                                                                                                                                                                               |
|                                        |                                               | If possible, avoid backing by using a route that allows you to pull through.                                                                                                                                                                                                                                                                                                                                                     |
|                                        |                                               | If you must back, do a quality 360° walk around.                                                                                                                                                                                                                                                                                                                                                                                 |
|                                        |                                               | Use a spotter to help guide the backing safely.                                                                                                                                                                                                                                                                                                                                                                                  |
|                                        |                                               | Look over the right shoulder and glance back to make sure fenders are clearing objects.                                                                                                                                                                                                                                                                                                                                          |
|                                        |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## TASK 4.2

### GROUNDWATER SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks                | Potential Hazards                             | Controls                                                                                                                                               |
|------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Well Sampling                | Hazardous material contact                    | Block/chock wheels.                                                                                                                                    |
|                              |                                               | Identify wells with hazardous concentrations of contaminants.                                                                                          |
|                              |                                               | Sample wells in order from least to most impacted.                                                                                                     |
| Sampling Equipment Operation | Cuts and bruises from Sample jar              | Wear proper gloves (nitrile, etc.) when handling jars, preservatives could leak during shipment from the laboratory.                                   |
|                              |                                               | Do not over-tighten glass jars (especially VOAs); they can break, causing a cut.                                                                       |
|                              |                                               |                                                                                                                                                        |
|                              | Splashes, electrical shocks, fires, caught by | Perform an equipment inspection before use; ensure that pumps, flow meters, and water quality meters are calibrated and are in good working condition. |
|                              |                                               | Use GFCI with all cords.                                                                                                                               |
|                              |                                               | Be sure all equipment (especially generators) is properly grounded.                                                                                    |
|                              | Manual lifting, equipment handling            | Completely shut down all equipment prior to conducting maintenance activities, fueling, servicing or repairs.                                          |
|                              |                                               | Use proper lifting techniques when lifting equipment (generators, pumps, air compressors, tubing, etc.). Seek assistance with heavy loads.             |
|                              |                                               |                                                                                                                                                        |
|                              | Noise                                         | Use work gloves where appropriate to prevent hand injuries.                                                                                            |
|                              |                                               | Wear steel toed boots.                                                                                                                                 |
|                              |                                               |                                                                                                                                                        |
|                              | Slips, trips and falls                        | Wear appropriate hearing protection during activities that produce noise (running generators, pumps, air compressors, etc.).                           |
|                              |                                               | Maintain a clean and sanitary work area free of tripping/slipping hazards.                                                                             |
|                              |                                               | Store hand tools in their proper storage location when not in use.                                                                                     |
|                              | Tool-related hazards                          | Provide ample space for each employee to work safely with sound footing.                                                                               |
|                              |                                               | Provide ample lighting.                                                                                                                                |
|                              |                                               | Provide adequate facilities/equipment/hand sanitizers for hand washing prior to eating.                                                                |
|                              |                                               | Do not use electrical tools with damaged cords or other electrical components.                                                                         |
|                              |                                               | Observe proper electrical safety practices.                                                                                                            |
|                              |                                               | Ensure tools are properly maintained; do not use damaged tools.                                                                                        |
|                              |                                               | Wear eye protection.                                                                                                                                   |
|                              |                                               | Store and carry tools correctly.                                                                                                                       |
|                              |                                               | Use the correct tool for the job.                                                                                                                      |
|                              |                                               | Protect from gouges, hammer blows, cutting tools, etc. Position your hands to prevent injury in case the tool slips while in use.                      |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                                 |                                              |                                                                 |
|-------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Job: Surface Water and Sediment Sampling</b> |                                              |                                                                 |
| <b>Analysis By: Kim Cichon</b>                  | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH</b> |
| <b>Date: October 14, 2011</b>                   | <b>Date: November 9, 2011</b>                | <b>Date: November 9, 2011</b>                                   |

## TASK 4.3 SURFACE WATER AND SEDIMENT SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                                                             | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface Water Sampling and/or Sediment Sampling – (lakes, ponds, streams) | Unescorted or vacant site /Working Alone                         | Do not assume that Site has been maintained for safety.                                                                                                                                                                                                                                                                         |
|                                                                           |                                                                  | Coordinate site visit with other personnel not present, so that your failure to return would be noticed. Sign out or call into the office to leave site specific information where you are working, the anticipated duration/hours of work on site. Do this for each site if multiple in one day. See GZA working alone policy. |
|                                                                           | Hunters, Abutters, and Property Owners                           | Always wear high visibility safety vest and hat. Make deliberate noise                                                                                                                                                                                                                                                          |
|                                                                           |                                                                  | Permission for field work on private and public lands must almost always be obtained in advance. When possible, contact the local landowners when on site.                                                                                                                                                                      |
|                                                                           |                                                                  | Leave the site immediately if threatened or made to feel uncomfortable.                                                                                                                                                                                                                                                         |
|                                                                           |                                                                  | Always announce yourself and your business at the site.                                                                                                                                                                                                                                                                         |
|                                                                           | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Leave the site immediately if threatened or made to feel uncomfortable.                                                                                                                                                                                                                                                         |
|                                                                           |                                                                  | Understand local hunting seasons and requirements.                                                                                                                                                                                                                                                                              |
|                                                                           |                                                                  | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F.                                                                                                                                                                                                                       |
|                                                                           |                                                                  | <ul style="list-style-type: none"><li>Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li><li>Check clothing for ticks frequently</li></ul>                                                                                                         |
|                                                                           |                                                                  | Check whole body immediately upon returning from field and shower.                                                                                                                                                                                                                                                              |
| Water Hazards                                                             |                                                                  | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                                                                             |
|                                                                           |                                                                  | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellant.                                                                                                   |
|                                                                           |                                                                  | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                                                                                   |
|                                                                           |                                                                  | Avoid areas with tall grasses, rocks/stone walls, wood piles/down trees.                                                                                                                                                                                                                                                        |
|                                                                           |                                                                  | Use sampler with extension/telescoping pole.                                                                                                                                                                                                                                                                                    |
|                                                                           |                                                                  | Use proper equipment (boots and waders, life jacket) if necessary to enter water.                                                                                                                                                                                                                                               |
|                                                                           |                                                                  | Do not reach over water.                                                                                                                                                                                                                                                                                                        |
|                                                                           |                                                                  | Use "buddy system."                                                                                                                                                                                                                                                                                                             |
|                                                                           |                                                                  | Review emergency plan prior to start of work.                                                                                                                                                                                                                                                                                   |
|                                                                           |                                                                  |                                                                                                                                                                                                                                                                                                                                 |

## TASK 4.3

### SURFACE WATER AND SEDIMENT SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards                       | Controls                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | Boat Hazards                            | Use U.S. Coast Guard-approved life jacket/vest.                                                                                                                                                                                                                                                                                                                                                                                  |
|               |                                         | Take boaters safety course.                                                                                                                                                                                                                                                                                                                                                                                                      |
|               |                                         | Have emergency ring buoys.                                                                                                                                                                                                                                                                                                                                                                                                       |
|               |                                         | Use "buddy system" at all times.                                                                                                                                                                                                                                                                                                                                                                                                 |
|               |                                         | Keep boat clean work area to avoid slips, trips, and falls.                                                                                                                                                                                                                                                                                                                                                                      |
|               |                                         | Use anchors to secure boat from drifting before sampling.                                                                                                                                                                                                                                                                                                                                                                        |
|               |                                         | Secure items in boat before moving boat.                                                                                                                                                                                                                                                                                                                                                                                         |
|               |                                         | Avoid loose fitting clothing that may get caught on sampling equipment.                                                                                                                                                                                                                                                                                                                                                          |
|               | Adverse weather                         | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                                                                                                                             |
|               |                                         | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                                    |
|               |                                         | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                                               |
|               |                                         | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed. |
|               |                                         | Stop work during lightening storms.                                                                                                                                                                                                                                                                                                                                                                                              |
|               | Chemical Hazards                        | Wear appropriate PPE as specified in Site Specific Health and Safety Plan.                                                                                                                                                                                                                                                                                                                                                       |
|               |                                         | Follow safe work practices identified in the plan and in accordance with training and review with all employees during tailgate meetings.                                                                                                                                                                                                                                                                                        |
|               |                                         | Be alert for site contaminants (odors, visual observations).                                                                                                                                                                                                                                                                                                                                                                     |
|               | Traffic Hazards                         | Use safety vests and safety cones when sampling at bridges or other access points near roads/parking areas.                                                                                                                                                                                                                                                                                                                      |
|               | Slips, trips and falls – uneven Terrain | Ensure stable footing before collecting sample.                                                                                                                                                                                                                                                                                                                                                                                  |
|               |                                         | Avoid areas along stream beds/shoreline that are "soft" or where slump may occur.                                                                                                                                                                                                                                                                                                                                                |
|               | Working Alone                           | Sign out or call into the office to leave site specific information where you are working, the anticipated duration/hours of work on site. Do this for each site if multiple in one day. Review GZA's working alone policy.                                                                                                                                                                                                      |
|               |                                         | Call office when off site.                                                                                                                                                                                                                                                                                                                                                                                                       |
|               | Emergency Conditions                    | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                           |
|               |                                         | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                              |
|               |                                         | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                             |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                                        |                                              |                                                                 |
|--------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Job: Excavation and Trenching (Heavy Equipment)</b> |                                              |                                                                 |
| <b>Analysis By: Andrew Whitsitt</b>                    | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH</b> |
| <b>Date: September 30, 2011</b>                        | <b>Date: November 10, 2011</b>               | <b>Date: December 9, 2011</b>                                   |

| <h2>TASK 4.4A</h2> <h3>EXCAVATION AND TRENCHING (HEAVY EQUIPMENT)</h3> |                                |                                                                                                                                                                                                 |
|------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HAZARD CONTROLS                                                        |                                |                                                                                                                                                                                                 |
| GZA Job Tasks                                                          | Potential Hazards              | Controls                                                                                                                                                                                        |
| Observation of Mobilizing Equipment by contractor                      | Collisions, struck by injuries | Wear high visibility vest at all times when out of personal or GZA vehicle.                                                                                                                     |
|                                                                        |                                | Park personal or GZA vehicle in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.                |
|                                                                        |                                | Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle.                                                     |
|                                                                        |                                | Confirm with contractor that police detail (if necessary) has been arranged to direct traffic while entering traffic safety zone.                                                               |
|                                                                        |                                | Stand clear of moving heavy equipment and away from any overhead utility lines until equipment is safely in position and parked properly and securely by the contractor.                        |
|                                                                        |                                | If the equipment contacts an overhead power line, inform any occupant and/or operator to remain in/on the rig until the line is de-energized. Summon help immediately.                          |
|                                                                        |                                | If possible, avoid backing by using a route that allows you to pull through.                                                                                                                    |
|                                                                        |                                | If you must back, do a quality 360° walkover.                                                                                                                                                   |
|                                                                        |                                | Use a spotter to help guide the backing safely.                                                                                                                                                 |
|                                                                        |                                | If you observe that contractor may back into structures, vehicles, fences, etc. notify contractor immediately.                                                                                  |
|                                                                        |                                | When backing own or GZA vehicle conduct a quality 360° walkover.                                                                                                                                |
|                                                                        |                                | If necessary, use a spotter to help guide the backing safely.                                                                                                                                   |
|                                                                        |                                | Look over the right shoulder and glance back to make sure fenders are clearing objects.                                                                                                         |
|                                                                        | Overhead electrical lines      | Confirm with contractor that overhead lines are cleared so that equipment, truck beds, etc. does not strike overhead utility. Stand clear of overhead lines while equipment is being mobilized. |
| Unloading equipment and materials                                      | Strains and sprains            | Use proper lifting techniques when lifting equipment. Seek assistance with heavy loads. GZA personnel <b>are not to</b> assist contractor with contractor's work.                               |
|                                                                        |                                | Use work gloves where appropriate to prevent hand injuries. Wear steel toed boots.                                                                                                              |
|                                                                        |                                | Use heavy equipment whenever possible to avoid heavy lifting.                                                                                                                                   |
|                                                                        | Trip and Fall Hazards          | Inspect site for uneven terrain or tripping hazards; plan travel route to avoid these areas or improve the site to eliminate the hazard.                                                        |
|                                                                        |                                | Clear brush from work area and clear vegetation that could cause trip hazards, eye injury or obstruct sight lines.                                                                              |
|                                                                        | Unstable equipment             | Ensure trailers are counter weighted properly before unloading equipment.                                                                                                                       |

# TASK 4.4A

## EXCAVATION AND TRENCHING (HEAVY EQUIPMENT)

### HAZARD CONTROLS

| GZA Job Tasks         | Potential Hazards                                            | Controls                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excavation operations | Struck by                                                    | Stay clear of equipment at all times. .                                                                                                                                                                                                                                                                                                                                           |
|                       |                                                              | Assure that operators are aware of your position on the site at all times.                                                                                                                                                                                                                                                                                                        |
|                       |                                                              | Wear high visibility reflective vests at all times while on site.                                                                                                                                                                                                                                                                                                                 |
|                       |                                                              | Heed back up alarms of all equipment.                                                                                                                                                                                                                                                                                                                                             |
|                       |                                                              | Do not approach operating heavy equipment until eye contact is made with operator and equipment operation is stopped.                                                                                                                                                                                                                                                             |
|                       |                                                              | Consult with contractor to properly maintain Site access roads to assure vehicles can safely leave and enter the Site.                                                                                                                                                                                                                                                            |
|                       | Underground utilities; above ground piping and appurtenances | Confirm with contractor that excavating equipment are properly staged and stabilized to avoid roll overs and accidents.                                                                                                                                                                                                                                                           |
|                       |                                                              | Be especially aware of and clear of the swing radius of all heavy equipment.                                                                                                                                                                                                                                                                                                      |
|                       |                                                              | Equipment buckets cannot be used to transport personnel from/into excavation.                                                                                                                                                                                                                                                                                                     |
|                       |                                                              | Confirm with contractor that proper utility location/clearance has been conducted prior to breaking ground.                                                                                                                                                                                                                                                                       |
|                       |                                                              | Confirm with contractor that safe distance from utilities, above ground piping and equipment are being maintained.                                                                                                                                                                                                                                                                |
|                       |                                                              | Have contractor hand excavate where required to expose utilities.                                                                                                                                                                                                                                                                                                                 |
|                       |                                                              | Where possible have contractor lockout and purge active utilities.                                                                                                                                                                                                                                                                                                                |
|                       |                                                              | If excavation exposes utilities, have the contractor assure that lines are properly supported.                                                                                                                                                                                                                                                                                    |
|                       |                                                              | Require the contractor to use non-sparking tools around active gas lines and implement safe work practices.                                                                                                                                                                                                                                                                       |
|                       |                                                              | If any damage is caused during excavation to utility lines notify utility owner.                                                                                                                                                                                                                                                                                                  |
|                       |                                                              | Make sure extinguishers are present in the work area, charged and currently inspected.                                                                                                                                                                                                                                                                                            |
|                       |                                                              | Notify utility owner if cathodic protection (coatings, groundbeds, etc.) has been exposed.                                                                                                                                                                                                                                                                                        |
|                       | Collisions with workers using shovels and hand tools         | Ensure that workers communicate and coordinate their actions and movements.                                                                                                                                                                                                                                                                                                       |
|                       | Falling objects, debris                                      | Wear hardhat and safety glasses/goggles.                                                                                                                                                                                                                                                                                                                                          |
|                       |                                                              | Do not work under raised loads                                                                                                                                                                                                                                                                                                                                                    |
|                       | Falls into Open Excavation                                   | Secure work zone using barricades, caution tape, etc.                                                                                                                                                                                                                                                                                                                             |
|                       |                                                              | DO NOT stand near edges of excavations.                                                                                                                                                                                                                                                                                                                                           |
|                       |                                                              | Keep non-essential personnel away from the work zone.                                                                                                                                                                                                                                                                                                                             |
|                       | Hazardous Liquid Spills                                      | Maintain spill control kit, including sorbents, pad booms and shovels.                                                                                                                                                                                                                                                                                                            |
|                       |                                                              | Line waste loading areas with polyethylene sheeting.                                                                                                                                                                                                                                                                                                                              |
|                       |                                                              | Immediately report any spill to the project manager.                                                                                                                                                                                                                                                                                                                              |
|                       | Exposure to Hazardous Substances                             | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Ensure that procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as needed; notify project manager if such conditions are encountered. |
|                       | Noise                                                        | Wear appropriate hearing protection.                                                                                                                                                                                                                                                                                                                                              |
|                       | Cave-In Hazards                                              | Ensure that excavation is monitored by a Competent Person.                                                                                                                                                                                                                                                                                                                        |
|                       |                                                              | Confirm with contractors that operators are properly trained for excavating.                                                                                                                                                                                                                                                                                                      |
|                       |                                                              | Ensure proper sloping/shoring for soil type.                                                                                                                                                                                                                                                                                                                                      |
|                       |                                                              | Ensure no standing water in excavation                                                                                                                                                                                                                                                                                                                                            |
|                       |                                                              | Place Spoils away from the edge of excavation as appropriate for the soil type.                                                                                                                                                                                                                                                                                                   |



# TASK 4.4A

## EXCAVATION AND TRENCHING (HEAVY EQUIPMENT)

### HAZARD CONTROLS

| GZA Job Tasks              | Potential Hazards                                       | Controls                                                                                                                                      |
|----------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                                                         | Excavations greater than 20 feet in depth must be designed by a registered professional engineer.                                             |
|                            |                                                         | Inspect excavations at the beginning of each shift and following rain events                                                                  |
|                            |                                                         | DO NOT enter excavations unless absolutely necessary. Ensure that excavation is safe to enter before entering.                                |
|                            | Hazardous Atmosphere                                    | Identify possible contaminants.                                                                                                               |
|                            |                                                         | Set action levels for exposure.                                                                                                               |
|                            |                                                         | Monitor air quality.                                                                                                                          |
|                            |                                                         | Ensure air monitoring equipment is properly calibrated.                                                                                       |
|                            |                                                         | Refer to the site specific Health and Safety Plan for the use of proper personal protective equipment (PPE) and respiratory protection.       |
|                            |                                                         | Provide adequate means of entering and exiting manned excavations at intervals of no more than 25 feet                                        |
|                            |                                                         | Ladders should extend above the ground surface at the edge of an excavation                                                                   |
| Soil Transport             | Roadway/traffic hazards                                 | Provide signage at blind intersections.                                                                                                       |
|                            |                                                         | Be alert at all times; never step outside traffic cones.                                                                                      |
|                            |                                                         | Wear high visibility vests at all times.                                                                                                      |
|                            |                                                         | Be familiar with escape routes at each location.                                                                                              |
|                            |                                                         | Regularly inspect cone pattern to ensure proper setup.                                                                                        |
|                            |                                                         | Modify traffic protection pattern as needed in response to "close call incidents."                                                            |
|                            |                                                         | Loads must be of proper weight for designated road routes.                                                                                    |
|                            | Hazardous Material Contamination                        | Materials should be properly covered, including use of tarping trucks.                                                                        |
|                            |                                                         | Be sure equipment and truck wheels, running boards, etc. are free of loose materials before leaving Site.                                     |
| Handling Flammable Liquids | Fire Hazards                                            | Ensure proper waste manifestation for loads.                                                                                                  |
|                            |                                                         | Use only approved fuel containers for fuel, heavy duty metal cans with stable base and self closing nozzle is recommended.                    |
| Tool Operation             | Cuts, bruises, shocks, lacerations, sprains and strains | Store flammable liquids in appropriate flammable storage cabinet.                                                                             |
|                            |                                                         | Do not use electrical tools with damaged cords or other electrical components.                                                                |
|                            |                                                         | Observe proper electrical safety practices.                                                                                                   |
|                            |                                                         | Ensure tools are properly maintained; do not use damaged tools.                                                                               |
|                            |                                                         | Wear eye and hearing protection.                                                                                                              |
|                            |                                                         | Store and carry tools correctly.                                                                                                              |
|                            |                                                         | Use the correct tool for the job.                                                                                                             |
|                            |                                                         | Support the work piece (using clamps, vise, sawhorse, or other device). Do not hold the work piece with your hand.                            |
| General site work          | Slips, trips and falls                                  | Unplug tools or remove batteries when servicing or changing bit, blades, abrasive wheels or other components.                                 |
|                            |                                                         | Protect your "off hand" from gouges, hammer blows, cutting tools, etc. Position your "of hand" to prevent injury in case of slip of the tool. |
|                            |                                                         | Maintain clean and sanitary work area free of tripping/slipping hazards.                                                                      |
|                            |                                                         | Store hand tools in their proper storage location when not in use.                                                                            |
|                            |                                                         | Ensure ample space for each employee to work safely with sound footing.                                                                       |

# TASK 4.4A

## EXCAVATION AND TRENCHING (HEAVY EQUIPMENT)

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards                                                      | Controls                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | Insect Bites; Plant toxins;<br>Poisonous Snakes.<br>Incidental contact | <p>Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F.</p> <ul style="list-style-type: none"> <li>• Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li> <li>• Check clothing for ticks frequently</li> <li>• Check whole body immediately upon returning from field and shower.</li> </ul>    |
|               |                                                                        | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                                                                                                                                                                              |
|               |                                                                        | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellant.                                                                                                                                                                                                    |
|               |                                                                        | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                                                                                                                                                                                    |
|               |                                                                        | Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.                                                                                                                                                                                                          |
|               | Adverse Weather Conditions                                             | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                                                                                                                             |
|               |                                                                        | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                                    |
|               |                                                                        | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                                               |
|               |                                                                        | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed. |
|               | Emergency Conditions                                                   | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                           |
|               |                                                                        | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                              |
|               |                                                                        | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                             |
|               |                                                                        | Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                                                                                                                                                       |
|               |                                                                        | Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.                                                                                                                                                                                                                                                                                                  |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                             |                                              |                                                                 |
|---------------------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Job: Manual Excavation and Trenching</b> |                                              |                                                                 |
| <b>Analysis By: Andrew Whatsitt</b>         | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH</b> |
| <b>Date: September 30, 2011</b>             | <b>Date: November 10, 2011</b>               | <b>Date: November 10, 2011</b>                                  |

## TASK 4.4B MANUAL EXCAVATION AND TRENCHING

### HAZARD CONTROLS

| GZA Job Tasks                                                   | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Vehicle Safety</b><br>Moving Vehicle and Trailer To Job Site | Collisions, injuries                                             | All drivers shall be properly licensed.                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                 |                                                                  | Perform pre-operation check of vehicle, ensuring service brakes, parking brake, steering, lights, tires, horn, wipers, mirrors and glass are in good condition. Ensure that the rig is roadworthy.                                                                                                                                                                                                               |
|                                                                 |                                                                  | Occupants shall wear seat belts.                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                 |                                                                  | Secure loose materials in cab or bed of vehicle.                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                 |                                                                  | Keep windows, lights clean.                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                 |                                                                  | Do not operate vehicle if in an unsafe condition.                                                                                                                                                                                                                                                                                                                                                                |
|                                                                 |                                                                  | Abide by driving safety procedures.                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                 |                                                                  | Inspect trailer hitch and make sure securely fastened.                                                                                                                                                                                                                                                                                                                                                           |
|                                                                 |                                                                  | Attach safety chains.                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                 |                                                                  | Check trailer light connections and make sure lights are in good operating order.                                                                                                                                                                                                                                                                                                                                |
|                                                                 |                                                                  | Locate trailers and parked vehicles out of right-of-ways, clear of facility traffic and in a manner the egress is not blocked.                                                                                                                                                                                                                                                                                   |
|                                                                 |                                                                  | Use emergency flashers if necessary to stop in right-of-ways.                                                                                                                                                                                                                                                                                                                                                    |
|                                                                 | Backing Collisions                                               | If possible, avoid backing by using a route that allows you to pull through.                                                                                                                                                                                                                                                                                                                                     |
|                                                                 |                                                                  | If you must back, do a quality 360° walkover.                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                 |                                                                  | Use a spotter to help guide the backing safely.                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                 | Unstable, uneven terrain                                         | Look over the right shoulder and glance back to make sure fenders are clearing objects.                                                                                                                                                                                                                                                                                                                          |
|                                                                 |                                                                  | Locate trailer on stable ground.                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                 |                                                                  | Level trailer with jacks, if necessary.                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                 | Overhead electrical lines                                        | Ensure jacks are on stable footing.                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                 |                                                                  | Block/chock wheels                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                 |                                                                  | Confirm with contractor that overhead lines are cleared so that equipment, truck beds, etc. does not strike overhead utility. Stand clear of overhead lines while equipment is being mobilized.                                                                                                                                                                                                                  |
| Unloading equipment and materials                               | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F. <ul style="list-style-type: none"> <li>Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li> <li>Check clothing for ticks frequently</li> <li>Check whole body immediately upon returning from field and shower.</li> </ul> |

# TASK 4.4B

## MANUAL EXCAVATION AND TRENCHING

### HAZARD CONTROLS

| GZA Job Tasks                                    | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                               |
|--------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unloading equipment and materials                | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                    |
|                                                  |                                                                  | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellent.                                          |
|                                                  |                                                                  | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                          |
|                                                  |                                                                  | Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.                                                |
| Site Setup<br>Manual lifting, equipment handling | Sprains and strains                                              | Use proper lifting techniques when lifting equipment. Seek assistance with heavy loads.<br>GZA personnel <b>are not to</b> assist contractor with contractor's work.                                                                                                   |
|                                                  |                                                                  | Use work gloves where appropriate to prevent hand injuries.<br>Wear steel toed boots.                                                                                                                                                                                  |
|                                                  |                                                                  | Use heavy equipment whenever possible to avoid heavy lifting.                                                                                                                                                                                                          |
|                                                  | Trip and Fall Hazards                                            | Inspect site for uneven terrain or tripping hazards; plan transportation route to avoid these areas or improve the site to eliminate the hazard.<br>Clear brush from work area and clear vegetation that could cause trip hazards, eye injury or obstruct sight lines. |
| Excavation Operations                            | Underground utilities; above ground piping and appurtenances     | Confirm with contractor that proper utility location/clearance has been conducted prior to breaking ground.                                                                                                                                                            |
|                                                  |                                                                  | Confirm with contractor that safe distance from utilities, above ground piping and equipment are being maintained.                                                                                                                                                     |
|                                                  |                                                                  | Have contractor hand excavate where required to expose utilities.                                                                                                                                                                                                      |
|                                                  |                                                                  | Where possible have contractor lockout and purge active utilities.                                                                                                                                                                                                     |
|                                                  |                                                                  | If excavation exposes utilities, have the contractor assure that lines are properly supported.                                                                                                                                                                         |
|                                                  |                                                                  | Require the contractor to use non-sparking tools around active gas lines and implement safe work practices.                                                                                                                                                            |
|                                                  |                                                                  | If any damage is caused during excavation to utility lines notify utility owner.                                                                                                                                                                                       |
|                                                  | Collisions with workers using shovels and hand tools             | Ensure that workers communicate and coordinate their actions and movements                                                                                                                                                                                             |
|                                                  | Falling objects, debris                                          | Wear hardhat and safety glasses/goggles.                                                                                                                                                                                                                               |
|                                                  | Falls into Open Excavation                                       | Secure work zone using barricades, caution tape, etc.                                                                                                                                                                                                                  |
|                                                  |                                                                  | DO NOT near edges of excavations                                                                                                                                                                                                                                       |
|                                                  |                                                                  | Keep non-essential personnel away from the work zone.                                                                                                                                                                                                                  |
|                                                  | Hazardous Spills                                                 | Maintain spill control kit, including sorbents, pad booms and shovels.                                                                                                                                                                                                 |
|                                                  |                                                                  | Line waste loading areas with polyethylene sheeting.                                                                                                                                                                                                                   |
|                                                  |                                                                  | Make timely notification of any spill.                                                                                                                                                                                                                                 |
|                                                  | Noise                                                            | Wear appropriate hearing protection.                                                                                                                                                                                                                                   |
|                                                  | Adverse weather                                                  | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                   |

# TASK 4.4B

## MANUAL EXCAVATION AND TRENCHING

### HAZARD CONTROLS

| GZA Job Tasks         | Potential Hazards                                       | Controls                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excavation Operations | Adverse weather                                         | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                                    |
|                       |                                                         | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                                               |
|                       |                                                         | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed. |
|                       | Slips, trips and falls                                  | Maintain clean and sanitary work area free of tripping/slipping hazards.                                                                                                                                                                                                                                                                                                                                                         |
|                       |                                                         | Store hand tools in their proper storage location when not in use.                                                                                                                                                                                                                                                                                                                                                               |
|                       |                                                         | Ensure ample space for each employee to work safely with sound footing.                                                                                                                                                                                                                                                                                                                                                          |
|                       | Cuts, bruises, shocks, lacerations, sprains and strains | Do not use electrical tools with damaged cords or other electrical components.                                                                                                                                                                                                                                                                                                                                                   |
|                       |                                                         | Observe proper electrical safety practices.                                                                                                                                                                                                                                                                                                                                                                                      |
|                       |                                                         | Ensure tools are properly maintained; do not use damaged tools.                                                                                                                                                                                                                                                                                                                                                                  |
|                       |                                                         | Wear eye and hearing protection.                                                                                                                                                                                                                                                                                                                                                                                                 |
|                       |                                                         | Store and carry tools correctly.                                                                                                                                                                                                                                                                                                                                                                                                 |
|                       |                                                         | Use the correct tool for the job.                                                                                                                                                                                                                                                                                                                                                                                                |
|                       |                                                         | Support the work piece (using clamps, vise, sawhorse, or other device). Do not hold the work piece with your hand.                                                                                                                                                                                                                                                                                                               |
|                       |                                                         | Unplug tools or remove batteries when servicing or changing bit, blades, abrasive wheels or other components.                                                                                                                                                                                                                                                                                                                    |
|                       |                                                         | Protect your "off hand" from gouges, hammer blows, cutting tools, etc. Position your "of hand" to prevent injury in case of slip of the tool.                                                                                                                                                                                                                                                                                    |
|                       |                                                         | Do not use electrical tools with damaged cords or other electrical components.                                                                                                                                                                                                                                                                                                                                                   |
|                       | Exposure to Hazardous Substances                        | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Ensure that procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as needed; notify project manager if such conditions are encountered.                                                |
|                       |                                                         | Refer to Site Specific Health and Safety Plan for work practices, air monitoring and decontamination procedures.                                                                                                                                                                                                                                                                                                                 |
|                       | Emergency Conditions                                    | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                           |
|                       |                                                         | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                              |
|                       |                                                         | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                             |
|                       |                                                         | Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                                                                                                                                                       |
|                       |                                                         | Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.                                                                                                                                                                                                                                                                                                  |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                         |                                                 |                                                                    |
|-----------------------------------------|-------------------------------------------------|--------------------------------------------------------------------|
| <b>Job: Soil-Gas Sampling</b>           |                                                 |                                                                    |
| <b>Analysis By:</b><br>Joseph DiAntonio | <b>Reviewed By:</b> Michael McCoy,<br>CIH, CHMM | <b>Approved By:</b> Kim Anderson, Ph.D.<br>Jayanti Chatterjee, CIH |
| <b>Date:</b> September 30, 2011         | <b>Date:</b> November 10, 2011                  | <b>Date:</b> December 10, 2011                                     |

## TASK 4.5 SOIL-GAS SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                              | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Collection of Soil-Gas for Sampling</b> | Exposure to Hazardous Substances                                 | Become familiar with hazards through review of Task Hazard Analysis and participate in daily safety tailgate meetings.                                                                                                                                                                                                                                                                 |
|                                            |                                                                  | Communicate Task Hazard Analysis and Lessons Learned information to field crew prior to initiating work and throughout the project as needed.                                                                                                                                                                                                                                          |
|                                            |                                                                  | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history).<br>Wear appropriate safety equipment as required by the Site Specific Health and Safety Plan (HASP) work area (hard hat, steel toe boots, work clothes, high visibility vest, eye and hearing protection, etc.). Implement work practices identified in the HASP. |
|                                            |                                                                  | Ensure that workers are familiar with hazards associated with products used where samples will be collected.<br>Ensure that workers are familiar with potential compounds of concern during the remedial investigation.<br>Ensure that MSDSs are available-                                                                                                                            |
|                                            | Emergency Conditions                                             | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                 |
|                                            |                                                                  | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                    |
|                                            |                                                                  | It is required that at least one individual in the field has had first aid training.<br>Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                     |
| <b>Sampling Near or In Roadways:</b>       | Personal injury due to vehicle traffic                           | Verify that proper utility locations/clearance has been performed and check area for evidence of underground features prior to breaking ground.                                                                                                                                                                                                                                        |
|                                            |                                                                  | Wear high visibility vest at all times when out of personal or GZA vehicle.                                                                                                                                                                                                                                                                                                            |
|                                            |                                                                  | Park personal or GZA vehicle in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.                                                                                                                                                                                                       |
|                                            |                                                                  | Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle.<br>Use police detail (if necessary) to direct traffic while entering traffic safety zone.                                                                                                                                                  |
| <b>Sampling in outdoor environment</b>     | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F.<br>• Tuck pants into long socks and apply DEET (or                                                                                                                                                                                                                           |

## TASK 4.5

### SOIL-GAS SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks                               | Potential Hazards                                                                           | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             |                                                                                             | <p>permethrin pre-treatment) to clothing in season to control exposure to ticks.</p> <ul style="list-style-type: none"> <li>• Check clothing for ticks frequently</li> <li>• Check whole body immediately upon returning from field and shower.</li> </ul> <p>Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.</p> <p>Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellent.</p> <p>Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.</p> <p>Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.</p> <p>Be aware of any site worker allergies, know where their epi-pen is if applicable.</p> |
| <b>Manual Installation of Sample Points</b> | Cuts, bruises, shocks, lacerations, sprains and strains                                     | <p>Do not use electrical tools with damaged cords or other electrical components.</p> <p>Observe proper electrical safety practices.</p> <p>Ensure tools are properly maintained; do not use damaged tools.</p> <p>Wear eye and hearing protection.</p> <p>Store and carry tools correctly.</p> <p>Use the correct tool for the job.</p> <p>Support the work piece (using clamps, vise, sawhorse, or other device). Do not hold the work piece with your hand.</p> <p>Unplug tools or remove batteries when servicing or changing bit, blades, abrasive wheels or other components.</p> <p>Protect your “off hand” from gouges, hammer blows, cutting tools, etc. Position your “of hand” to prevent injury in case of slip of the tool.</p> <p>Do not use electrical tools with damaged cords or other electrical components.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Generator Use</b>                        | Fire / burn hazards from generator used to power, rotary drill, hammer drill, lighting etc. | <p>Ensure that all flammable/combustible liquids are stored in proper containers.</p> <p>Ensure that a fire extinguisher is present on site.</p> <p>Ensure generator is placed on level, stable ground. Be sure to keep exhaust port/pipe away from potential flammable materials (i.e. dry brush, oily rags etc).</p> <p>Use careful around hot exhaust port/pipe</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |





# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                             |                                              |                                         |
|---------------------------------------------|----------------------------------------------|-----------------------------------------|
| <b>Job: AST/UST Inspection and Sampling</b> |                                              |                                         |
| <b>Analysis By:</b>                         | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D.</b> |
| <b>Date:</b>                                | <b>Date: November 17, 2011</b>               | <b>Date: November 17, 2011</b>          |

## TASK 4.6 AST/UST INSPECTION AND SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                              | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Observation of Excavation Operations       | Various Physical hazards                                         | Review THA for Excavation 4.4a Excavation and Trenching (Heavy Equipment).                                                                                                                                                                                                                                                                                                                                       |
| Inspection of AST/UST (only after removal) | Traffic Hazards                                                  | Be alert for moving vehicles, equipment, pedestrians.                                                                                                                                                                                                                                                                                                                                                            |
|                                            |                                                                  | Wear high visibility safety vest.                                                                                                                                                                                                                                                                                                                                                                                |
|                                            |                                                                  | Maintain eye contact with equipment operator when moving around excavation area.                                                                                                                                                                                                                                                                                                                                 |
|                                            | Struck by/crushed by                                             | Verify that the tank is stable ground and properly chocked and braced before approaching to inspect.                                                                                                                                                                                                                                                                                                             |
|                                            |                                                                  | DO NOT stand within swing radius of the equipment or underneath tank when it is being removed from underground or from its above ground location to observe cracks/holes on the tanks.                                                                                                                                                                                                                           |
|                                            |                                                                  | DO NOT enter excavations to inspect USTs.                                                                                                                                                                                                                                                                                                                                                                        |
|                                            | Cuts and lacerations                                             | Be aware of sharp edges from saw cut made for cleaning on the tanks. Use gloves and approach with caution.                                                                                                                                                                                                                                                                                                       |
|                                            | Slips, trips and falls                                           | Stand away from edge of excavations.                                                                                                                                                                                                                                                                                                                                                                             |
|                                            |                                                                  | Be aware of excavation stability.                                                                                                                                                                                                                                                                                                                                                                                |
|                                            |                                                                  | DO NOT enter excavation unless absolutely necessary.                                                                                                                                                                                                                                                                                                                                                             |
|                                            |                                                                  | Never enter excavation that is not properly sloped/shored and has adequate egress means (ladders every 25 ft).                                                                                                                                                                                                                                                                                                   |
|                                            | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F. <ul style="list-style-type: none"> <li>Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li> <li>Check clothing for ticks frequently</li> <li>Check whole body immediately upon returning from field and shower.</li> </ul> |
|                                            |                                                                  | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                                                                                                                                                              |
|                                            |                                                                  | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellant.                                                                                                                                                                                    |
|                                            |                                                                  | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                                                                                                                                                                    |
|                                            |                                                                  | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                                                                                                             |
|                                            | Adverse weather                                                  | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                    |
|                                            |                                                                  | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                               |



## TASK 4.6

### AST/UST INSPECTION AND SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks                     | Potential Hazards                        | Controls                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |                                          | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed. |
| Sample Collection from excavation | Slips, trips, falls, struck by           | Ensure stable footing before collecting sample.                                                                                                                                                                                                                                                                                                                                                                                  |
|                                   |                                          | Carefully coordinate sample locations with operator and laborers.                                                                                                                                                                                                                                                                                                                                                                |
|                                   |                                          | Wait for operator to signal before approaching bucket to collect sample.                                                                                                                                                                                                                                                                                                                                                         |
|                                   | Chemical Hazards<br>Excavation Equipment | Prepare H&S Plan and review with all employees during daily tailgate meeting.                                                                                                                                                                                                                                                                                                                                                    |
|                                   |                                          | Wear appropriate PPE as specified in the Site Health and Safety Plan (HASP).                                                                                                                                                                                                                                                                                                                                                     |
| General site work                 | Emergency Conditions                     | Be alert for site contaminants (odors, visual observations).                                                                                                                                                                                                                                                                                                                                                                     |
|                                   |                                          | Implement work practices and monitoring identified in the HASP.                                                                                                                                                                                                                                                                                                                                                                  |
|                                   |                                          | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                           |
|                                   |                                          | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                              |
|                                   |                                          | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                             |
|                                   |                                          | Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                                                                                                                                                       |
|                                   |                                          | Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.                                                                                                                                                                                                                                                                                                  |
|                                   |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                  |



## GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: Temporary/Permanent Sampling Equipment Operation**

**Analysis By: James Wieck**

**Reviewed By: Michael McCoy,  
CIH, CHMM**

**Approved By: Kim Anderson, Ph.D.  
Jayanti Chatterjee, CIH**

**Date: September 30, 2011**

**Date: November 17, 2011**

**Date: December 10, 2011**

### **TASK 4.7 TEMPORARY/PERMANENT SAMPLING EQUIPMENT OPERATION**

#### **HAZARD CONTROLS**

| <b>GZA Job Tasks</b>                                                                                                                                                       | <b>Potential Hazards</b>                                         | <b>Controls</b>                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation of equipment within monitoring wells by GZA (transducers, probes and multiparameter sondes, pumps, solid and pneumatic slugs, and borehole logging equipment) | Cuts, lacerations, bruises, pinch points, electrical shocks.     | Become familiar with equipment installation procedures and related hazards through review of Job Hazard Analysis and participate in daily safety tailgate meetings.                                                                                                                                                                                                                                                |
|                                                                                                                                                                            |                                                                  | Review potential pinch, trip, abrasion/cut, and entanglement hazards. Wear gloves to limit potential pinch, cut, and abrasion hazards.                                                                                                                                                                                                                                                                             |
|                                                                                                                                                                            |                                                                  | Wear appropriate safety equipment as required by the Site Specific Health and Safety Plan when in general work area (steel toe boots, work clothes, gloves, high visibility vest, eye and hearing protection, etc.).                                                                                                                                                                                               |
|                                                                                                                                                                            |                                                                  | Keep cables, electrical lines, tubing organized and within view when installing or retrieving from well.                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                            |                                                                  | Review weight of equipment being installed or retrieved and select methods sufficient to insure control of deployment/retrieval rate with equipment suspended in well.                                                                                                                                                                                                                                             |
|                                                                                                                                                                            |                                                                  | If tripods and winches are needed to control the deployment or retrieval of equipment, review related safety procedures and manufacturers recommendations; consider hazards associated with electrical or fuel power sources and exhaust as applicable and consider entanglement and overhead hazards.                                                                                                             |
|                                                                                                                                                                            |                                                                  | Use a dedicated cable or cord secured to the equipment and the well casing or secure object at the ground surface for deployment and retrieval. Do not deploy or retrieve equipment using data cables or sample tubing to carry the weight of the equipment.                                                                                                                                                       |
|                                                                                                                                                                            | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | Use caution when opening monitoring wells for the presence of insects and vermin. Wear gloves to protect against unanticipated stinging insects or biting vermin.                                                                                                                                                                                                                                                  |
|                                                                                                                                                                            |                                                                  | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F. <ul style="list-style-type: none"><li>• Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li><li>• Check clothing for ticks frequently</li><li>• Check whole body immediately upon returning from field and shower.</li></ul> |
|                                                                                                                                                                            |                                                                  | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                                                                                                                                                                |

# TASK 4.7

## TEMPORARY/PERMANENT SAMPLING EQUIPMENT OPERATION

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards                | Controls                                                                                                                                                                                                                                                                                                               |
|---------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                  | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellent.                                                                                          |
|               |                                  | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                                                                          |
|               |                                  | Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.                                                                                                |
|               | Exposure to Hazardous Substances | Ensure that workers are familiar with hazards associated with hazardous commercial products used in drilling (fuels, calibration solutions, etc.). Ensure that MSDSs for such products are available, and that workers wear appropriate personal protective equipment.                                                 |
|               |                                  | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Ensure that procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as needed. |
|               |                                  | Implement work practices and procedures identified in the HASP.                                                                                                                                                                                                                                                        |
|               | Adverse Weather Conditions       | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                   |
|               |                                  | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                          |
|               |                                  | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                     |
|               | Emergency Procedures             | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                 |
|               |                                  | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                    |
|               |                                  | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                   |
|               |                                  | Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                                             |
|               |                                  | Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.                                                                                                                                                                                        |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                       |                                              |                                         |
|---------------------------------------|----------------------------------------------|-----------------------------------------|
| <b>Job: Subsurface Vapor Sampling</b> |                                              |                                         |
| <b>Analysis By: Guy Dalton</b>        | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D.</b> |
| <b>Date: September 29, 2011</b>       | <b>Date: November 17, 2011</b>               | <b>Date: December 10, 2011</b>          |

## TASK 4.8 SUBSURFACE VAPOR SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                                                                                                                                                                                                                                                                                                                                                                              | Potential Hazards                                                | Controls                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><u>Review Related THA's –</u><br/>           4.1 Drilling Observations, Monitoring Well Installation Observations and Soil Sampling<br/>           4.5 Soil-Gas Sampling<br/>           4.7 Temporary/Permanent Sampling Equipment Operation</p> <p><b>NOTE</b> - As a sampling THA, this THA assumes the subsurface vapor sampling well(s) or port(s) have already been installed.</p> |                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Pre-work tasks                                                                                                                                                                                                                                                                                                                                                                             | Emergency Conditions                                             | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.                                                                                                                                                                                                                                                                                               |
| Screening Work Zone Atmosphere                                                                                                                                                                                                                                                                                                                                                             | Exposure to Hazardous Substances                                 | Review site specific Health and Safety Plan and implement work practices and procedures specified.                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Monitor breathing air in work zone for hazardous atmospheres (e.g., low oxygen, elevated VOCs, H <sub>2</sub> S, CO, etc.) and do not proceed unless it is determined that no hazardous conditions exist.                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Assure that procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as needed.                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Assure adequate facilities/equipment for hand washing prior to eating.                                                                                                                                                                                                                                                                                                                                                        |
| All Site related work Work                                                                                                                                                                                                                                                                                                                                                                 | Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact | <p>Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F.</p> <ul style="list-style-type: none"> <li>• Tuck pants into long socks and apply DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks.</li> <li>• Check clothing for ticks frequently</li> <li>• Check whole body immediately upon returning from field and shower.</li> </ul> |
|                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Know the appearance of poison ivy and poison sumac in all seasons, and if sensitive to these toxins, carry and use special cleaning soaps/solutions when thought to be exposed. Stock first aid kit with poison ivy/sumac cleaning soaps/solutions.                                                                                                                                                                           |

# TASK 4.8

## SUBSURFACE VAPOR SAMPLING

### HAZARD CONTROLS

| GZA Job Tasks                      | Potential Hazards                                       | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    |                                                         | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use DEET or other mosquito repellent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                    |                                                         | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing protection and netting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                    |                                                         | Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                    | Adverse weather                                         | <p>Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.</p> <p>Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).</p> <p>Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.</p> <p>Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.</p> |
|                                    | Working Alone                                           | <p>Sign out or call into the office to leave site specific information where you are working, the anticipated duration/hours of work on site. Do this for each site if multiple in one day. Review GZA's working alone policy.</p> <p>Call office when off site.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Constructing Sampling Train        | Slips, trips and falls                                  | Store hand tools in their proper storage location when not in use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                    |                                                         | Assure ample space for each employee to work safely with sound footing is provided.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                    |                                                         | Assure ample lighting is provided.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                    | Electrical shocks, cuts, bruises, from Tool-Related use | <p>Do not use electrical tools with damaged cords or other electrical components.</p> <p>Observe proper electrical safety practices.</p> <p>Assure tools are properly maintained; do not use damaged tools.</p> <p>Wear eye protection.</p> <p>Store and carry tools correctly.</p> <p>Use the correct tool for the job.</p> <p>Protect "off hand" from gouges, hammer blows, cutting tools, etc. Position your "off hand" to prevent injury in case of slip of the tool.</p>                                                                                                                                                                                                                                                                                                                      |
| Evaluating Leaks in Sampling Train | Working with Pressurized Cylinders (Helium)             | Use caution when screwing in pressure regulator and valve (if this wasn't already done by the helium vendor). Take care not to hit the regulator and valve once it is installed and do not drop the cylinder. Cylinder should remain on the ground surface at all times or (ideally) fixed to a cylinder dolly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Purging the Sampling Train         | Working with Electrical Equipment                       | <p>If using 12-volt DC pump to purge sampling train, inspect power cord and battery terminal connectors to assure they are free of defects or damage.</p> <p>If using 120-volt AC pump to purge sampling train, verify that the ground fault circuit interrupter (GFCI) is functioning properly.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                    | Electrical shocks, cuts, bruises, from Tool-Related use | See above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Sample Collection                  | Electrical shocks, cuts,                                | See above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

# **TASK 4.8** **SUBSURFACE VAPOR SAMPLING**

## **HAZARD CONTROLS**

| <b>GZA Job Tasks</b> | <b>Potential Hazards</b>       | <b>Controls</b> |
|----------------------|--------------------------------|-----------------|
|                      | bruises, from Tool-Related use |                 |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

|                                 |                                              |                                                                 |
|---------------------------------|----------------------------------------------|-----------------------------------------------------------------|
| <b>Job: Landfill Sampling</b>   |                                              |                                                                 |
| <b>Analysis By: Mark Dalpe</b>  | <b>Reviewed By: Michael McCoy, CIH, CHMM</b> | <b>Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH</b> |
| <b>Date: September 29, 2011</b> | <b>Date: November 8, 2011</b>                | <b>Date: December 10, 2011</b>                                  |

| <h2>TASK 4.9</h2> <h3>LANDFILL SAMPLING</h3>                                                                                                                                                   |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HAZARD CONTROLS                                                                                                                                                                                |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| GZA Job Tasks                                                                                                                                                                                  | Potential Hazards                | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <u>Review Related THA's –</u><br>4.1 Drilling Observations, Monitoring Well Installation Observations and Soil Sampling<br>4.2 Groundwater Sampling<br>4.3 Surface Water and Sediment Sampling |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Surface Water /Groundwater Sample Collection                                                                                                                                                   | Slips, Trips, Falls, Drowning    | Become familiar with surface water and landfill topography related hazards through review of Task Hazard Analysis and site reconnaissance.<br>Communicate Task Hazard Analysis and Lessons Learned information to sampling crews prior to initiating work and throughout the project as needed.<br>Maintain safe distance from dams, weirs, ice bridges, and steep slopes during sampling operations.<br>Be cognizant of slip/trip/fall hazards associated with wooded areas, mud flats, rip-rap banks and shorelines, refuse, and pits/holes during water/monitoring well access. Coordinate all required sampling/logging activities with supervisor/project manager prior to initiating sampling operations. Those sampling locations that are not safely accessible may be sampled via remote sampling methods (i.e. dip poles, and sampling pumps with drop tubing). Sharp objects in refuse are common in landfill areas. Appropriate puncture resistant steel-toed safety shoes shall be worn at all times.<br>Wear appropriate safety equipment as required by the Site Specific Health and Safety Plan (HASP) when in the vicinity of surface water bodies, and monitoring wells (hard hat, steel toe boots, work clothes, high visibility vest, eye protection, personal floatation devices, etc.).<br>Implement work practices and procedures specified in the HASP. |
|                                                                                                                                                                                                | Exposure to Hazardous Substances | LEL and H <sub>2</sub> S monitoring devices shall be employed for screening purposes prior to collecting samples from landfill monitoring wells. Refer to HASP for action levels for air monitoring and implement as specified.<br>Ensure that workers are familiar with hazards associated with hazardous commercial/laboratory products used in sampling operations (acid containing batteries, preservatives decontamination products, etc.). Ensure that MSDSs for such products are available, and that workers wear appropriate personal protective equipment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## TASK 4.9

### LANDFILL SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks                  | Potential Hazards                                                    | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                |                                                                      | Be alert for hazardous site contaminants (as indicated by odor, visual characteristics, location, and site history). Leachate break-outs are common at active landfills. Use caution when in the vicinity of leachate pools and avoid contact. Be aware of staining and precipitate on wellhead standpipes of monitoring wells indicating flowing landfill gas effluent. Ensure that procedures and contingencies are in place for characterizing hazards and protecting workers by use of appropriate personal protective clothing and respiratory protection, as specified in the HASP. Be aware of dust levels that may contain various contaminants in landfill areas. |
| All site work                  | Emergency Procedures                                                 | Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                |                                                                      | Ensure a first aid kit is present in field vehicle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                |                                                                      | It is required that at least one individual in the field has had first aid training.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                |                                                                      | Discuss any worker physical conditions that may require medical attention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                |                                                                      | Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                | Adverse Weather Conditions                                           | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                |                                                                      | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                |                                                                      | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Landfill Gas Sample Collection | Landfill Gas Exposure                                                | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.                                                                                                                                                                                                                                           |
|                                |                                                                      | LEL/O <sub>2</sub> , H <sub>2</sub> S, and PID monitoring devices are imperative during landfill gas sampling operations. Refer to HASP for air monitoring requirements for H <sub>2</sub> S, and other contaminants.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                | Noise                                                                | Hearing protection is imperative at sampling points in the vicinity of operating power plants, booster blowers etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                | Slips, trips and falls                                               | Maintain clean and sanitary work area free of tripping/slipping hazards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                |                                                                      | Store hand tools in their proper storage location when not in use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                |                                                                      | Ensure ample space for each employee to work safely with sound footing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                |                                                                      | Ensure ample lighting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                | Electrical shocks, cuts, bruises, fires, burns from Tool-Related use | Ensure adequate facilities/equipment for hand washing prior to eating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                |                                                                      | Do not use electrical tools with damaged cords or other electrical components.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                |                                                                      | Observe proper electrical safety practices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                |                                                                      | Ensure tools are properly maintained; do not use damaged tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                |                                                                      | Wear eye protection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                |                                                                      | Store and carry tools correctly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                |                                                                      | Use the correct tool for the job.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                |                                                                      | Ensure that all flammable/combustible liquids are stored in proper containers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                |                                                                      | Dispose of oily rags properly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



## TASK 4.9

### LANDFILL SAMPLING

#### HAZARD CONTROLS

| GZA Job Tasks                             | Potential Hazards | Controls                                              |
|-------------------------------------------|-------------------|-------------------------------------------------------|
| Generator/Gas Powered Equipment Operation | Fire hazards      | Ensure that a fire extinguisher is present with crew. |
|                                           |                   | Observe "no smoking" policies.                        |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

Job: Field Sampling

|                                                  |                                      |                                      |
|--------------------------------------------------|--------------------------------------|--------------------------------------|
| Analysis By: Christie Wagner                     | Reviewed By: Jayanti Chatterjee, CIH | Approved By: Jayanti Chatterjee, CIH |
| Date: November 4, 2011<br>Revised: July 12, 2012 | Date: July 12, 2012                  | Date: July 12, 2012                  |

## Task 20.11 Field Sampling

### HAZARD CONTROLS

| GZA Job Tasks                                             | Potential Hazards                        | Controls                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Review Related THA's –<br>21.1 General Outdoor Field Work |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Pre work task for site visit                              | Adverse Weather Conditions               | Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.                                                                                                                                                                                                                                                                                                                             |
|                                                           |                                          | Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work).                                                                                                                                                                                                                                                                                                    |
|                                                           |                                          | Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.                                                                                                                                                                                                                                                                                                                               |
| Conduct visual inspection of site                         | Dangerous Terrain                        | Be aware of the anticipated weather conditions prior to mobilization to the site. Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightening, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed. |
|                                                           |                                          | Be aware of the site terrain, watch for holes and rocks that can be tripping hazards                                                                                                                                                                                                                                                                                                                                             |
| Collecting sample                                         | Muscle strain from lifting heavy objects | Learn to identify and watch for plants such as thorn bushes and poison ivy that can either scratch you or give you a rash.                                                                                                                                                                                                                                                                                                       |
|                                                           | Exposure to unknown sample               | Use proper lifting techniques. Use appropriate mechanical assistance and tools when possible.<br>Wear work gloves and steel toed boots.                                                                                                                                                                                                                                                                                          |
|                                                           |                                          | Be sure to treat effluent samples as unknowns and wear the proper PPE.                                                                                                                                                                                                                                                                                                                                                           |
|                                                           |                                          | If there are any unusual odors/fumes coming from a sample, especially those that cause reactions in the eyes or nose, leave the area and inform a supervisor immediately.                                                                                                                                                                                                                                                        |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work

Analysis By: Anthony Zemba,  
CHMM

Reviewed By: Guy Dalton

Approved By: Jayanti Chatterjee , CIH

Date: June 25, 2012

Date: June 25, 2012

Date: July 12, 2012

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks                                                        | Potential Hazards                     | Controls                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-work preparation                                                 | Overlooking of potential hazards      | Become familiar with project area and job site by reviewing available on-line mapping (USGS Topographic, NWI Wetland, NRCS Soil, etc.; and aerial photographs before visiting site. Understand related hazards through review of this and other Task Hazard Analyses and participate in daily safety tailgate meetings (where applicable). |
|                                                                      |                                       | Communicate Task Hazard Analysis and Lessons Learned information to operator(s) prior to initiating work and throughout the project as needed.                                                                                                                                                                                             |
| Driving to site                                                      | Vehicle accidents/collisions/injuries | Perform pre-operation check of vehicle, verifying service brakes, parking brake, steering, lights, tires, horn, wipers mirrors and glass are in good condition. verify that the rig is roadworthy.                                                                                                                                         |
|                                                                      |                                       | Wear seat belts always when driving even on site.                                                                                                                                                                                                                                                                                          |
|                                                                      |                                       | Secure loose materials in cab or bed of vehicle.                                                                                                                                                                                                                                                                                           |
|                                                                      |                                       | Keep windshields, windows and lights cleans.                                                                                                                                                                                                                                                                                               |
| Working within transportation corridors or active construction sites | Collisions injuries                   | Abide by safe driving procedures.                                                                                                                                                                                                                                                                                                          |
|                                                                      |                                       | Backing collisions                                                                                                                                                                                                                                                                                                                         |
|                                                                      |                                       | If possible avoid backing by using a route that allows you to pull through.                                                                                                                                                                                                                                                                |
|                                                                      |                                       | If backing up from a parked area do a quality 360 walker.                                                                                                                                                                                                                                                                                  |
|                                                                      |                                       | Wear high visibility safety vest on site when out of personal or GZA vehicle.                                                                                                                                                                                                                                                              |
|                                                                      |                                       | Park vehicle in designated parking locations, or select off-road area that is firm, and without hazards. Directly inspect parking location on foot if necessary.                                                                                                                                                                           |
|                                                                      |                                       | Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking vehicle.                                                                                                                                                                                                                |
|                                                                      |                                       | Use emergency flashers or other appropriate vehicle warning system when parking outside of standard parking spaces, or to stop in right-of-                                                                                                                                                                                                |
|                                                                      |                                       | Be alert at all times; never step outside traffic cones.                                                                                                                                                                                                                                                                                   |
|                                                                      |                                       |                                                                                                                                                                                                                                                                                                                                            |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work

Analysis By: Anthony Zemba,  
CHMM

Reviewed By: Guy Dalton

Approved By: Jayanti Chatterjee , CIH

Date: June 25, 2012

Date: June 25, 2012

Date: July 12, 2012

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks                      | Potential Hazards                                                     | Controls                                                                                                                                                                                                                                                           |
|------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    |                                                                       | Stand clear of moving heavy equipment and away from any overhead utility lines until equipment is safely in position and parked properly and securely by the contractor.                                                                                           |
|                                    |                                                                       | Do not wear headphones or earbuds, or listen to music or talk on the phone, which may distract from work hazards.                                                                                                                                                  |
|                                    | Crossing Automobile traffic lanes                                     | Wear high visibility safety vests at all times when out of vehicle and working within or adjacent to the roadway.                                                                                                                                                  |
|                                    | Crossing Airport Movement Areas (e.g., Runways, taxiways, approaches) | Learn, know, and conform to project site Airport's, Airfield's, or Airbase's protocol for crossing movement areas (whether on foot or in vehicle).                                                                                                                 |
|                                    |                                                                       | Work within airport movement areas or safety zones must be coordinated with the Air Traffic Control Tower.                                                                                                                                                         |
|                                    |                                                                       | Vehicles to have blinking or flashing lights or beacons; pedestrians to wear high visibility safety vests.                                                                                                                                                         |
|                                    |                                                                       | Using protocol, maintain communication with airport security and air traffic controllers.                                                                                                                                                                          |
|                                    | Crossing Railways                                                     | Work within active railroad ROWs requires railroad safety training. No work can be done within the railroad traffic envelope without the permission of a railroad flagman.                                                                                         |
|                                    |                                                                       | No equipment or vehicles can cross without the permission of a railroad flagman.                                                                                                                                                                                   |
|                                    |                                                                       | Expect any train on any track coming from either direction at any time.                                                                                                                                                                                            |
| Working in Natural or Remote Areas | Slips, trips, fall                                                    | Be aware of loose ground materials such as talus, unconsolidated rock, soil, sediment, ice and other media that could cause slips, trips or falls.                                                                                                                 |
|                                    |                                                                       | Be careful when walking in heavily vegetated areas. Mind tangles of vines, thorny branches, and slippery logs and rock surfaces. Dense vegetation and especially entangled vines present trip hazards, or can mask voids, sharp objects, or other hazards beneath. |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: General Outdoor Field Work**

**Analysis By: Anthony Zemba,  
CHMM**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: June 25, 2012**

**Date: June 25, 2012**

**Date: July 12, 2012**

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards | Controls                                                                                            |
|---------------|-------------------|-----------------------------------------------------------------------------------------------------|
|               |                   | Be vigilant for signs of cracking, shifting, fracturing, and evidence of past movement.             |
|               |                   | Use wood mats or other stabilizing materials for equipment if soft ground conditions are present.   |
|               |                   | Use walking stick, auger, or ski poles to steady yourself when traversing loose material or slopes. |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: General Outdoor Field Work**

**Analysis By: Anthony Zemba,  
CHMM**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: June 25, 2012**

**Date: June 25, 2012**

**Date: July 12, 2012**

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards             | Controls                                                                                                                                                                                                                        |
|---------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                               | Wear proper footwear for conditions.                                                                                                                                                                                            |
|               |                               | Store tools in their proper storage location when not in use.                                                                                                                                                                   |
|               |                               | Provide adequate lighting when necessary.                                                                                                                                                                                       |
|               | Falls into excavations/ voids | Stand away from edges of excavations and voids. Do not attempt access without proper equipment / training. Remember that some excavations or voids may constitute a confined space and may present structural stability issues. |
|               | Cave-ins and engulfment       | DO NOT enter caves, sinkholes, excavations, and other voids or concavities that are not sloped or shored properly and have not been evaluated by a competent person to be safe.                                                 |
|               |                               | Stand away from edges of excavations, cliffs, dug wells, and other voids.                                                                                                                                                       |
|               |                               | Watch for cracks/fissures in the ground surface in the immediate vicinity of a pit or void, which indicate imminent sidewall failure/cave-in.                                                                                   |
|               |                               | Assess if confined space entry procedures need to be implemented.                                                                                                                                                               |
|               |                               | Before entering void (if required to do so and with proper training) be aware of any hazards at the surface (boulders, equipment) which may fall into the void.                                                                 |
|               | Working among hazardous biota | Plant toxins Incidental contact                                                                                                                                                                                                 |
| Ticks         |                               |                                                                                                                                                                                                                                 |
| Ticks         |                               | Ticks carry risk of Lyme's and other Diseases. Tick season is basically any field day above 40 degrees F.                                                                                                                       |
|               |                               | Tuck pants into long socks.                                                                                                                                                                                                     |
|               |                               | The application of DEET (or permethrin pre-treatment) to clothing in season to control exposure to ticks is recommended.                                                                                                        |
|               |                               | Check clothing for ticks frequently.                                                                                                                                                                                            |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: General Outdoor Field Work**

**Analysis By: Anthony Zemba,  
CHMM**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: June 25, 2012**

**Date: June 25, 2012**

**Date: July 12, 2012**

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards       | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                         | Check whole body immediately upon returning from field and shower.                                                                                                                                                                                                                                                                                                                                                                                                   |
|               | Mosquitoes              | Be aware of intermittent seasonal reports of mosquito borne diseases, such as West Nile disease and Eastern Equine Encephalitis (EEE), and their locations relative to your field site. Use of DEET or other mosquito repellent is recommended.                                                                                                                                                                                                                      |
|               | Stinging bees and wasps | Be aware of potential cavity, suspended or ground nesting bee/wasp/hornet nests. Avoid undue disturbance or approach with appropriate safety clothing, protection and netting.<br>Take appropriate precautions if allergic to bees. Carry at least two epi-pens in first aid kit as well as anti-histamines (oral and inhalers).<br>Avoid areas of heavy bee activity if allergic. Avoid perfumed soaps, shampoos, deodorants, colognes, etc. that may attract bees. |
|               | Poisonous Snakes        | Be aware of terrain likelihood of harboring poisonous snakes in your work zone. Avoid reaching or stepping into hidden areas (such as into wood pile, rock pile, debris pile, stone wall, etc.) without pre-inspection.<br>Coordinate with local hospitals to verify they have proper anti-venom in stock.<br>Learn first aid procedures in case of poisonous snake bite.<br>Devise an action plan and include in the site-specific HASP.                            |
|               | Wild Animals            | Do NOT handle wildlife unless properly trained to do so.<br>Beware of any wild animal that shows no sign of wariness of humans.<br>Do NOT attempt to feed wild animals or to help apparently injured wild animals.<br>Be aware of domestic animals that may also pose a threat such as dogs off leash, bulls out to pasture, etc.                                                                                                                                    |
|               |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|               |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|               |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|               |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|               |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

Job: General Outdoor Field Work

Analysis By: Anthony Zemba,  
CHMM

Reviewed By: Guy Dalton

Approved By: Jayanti Chatterjee , CIH

Date: June 25, 2012

Date: June 25, 2012

Date: July 12, 2012

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks                         | Potential Hazards                                    | Controls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Working in Adverse Weather Conditions | Heat / cold stress and other weather related hazards | <p>Assess weather conditions prior to on-site work and examine forecast for anticipated period of work.</p> <p>Dress appropriately for weather conditions (e.g., precipitation, temperature ranges over anticipated duration of field work). Include clothing and the presence / absence of shade when calculating a heat index.</p> <p>Schedule work day to avoid working during hottest or coldest parts of the day, to the extent practicable.</p> <p>Keep exposed skin covered in extremely cold weather.</p> <p>Recognize signs of frostbite; use warming packs and layer clothing to maintain warmth.</p> <p>Use a wicking layer of clothing against your body to keep moisture away from skin.</p> <p>Wool clothing will continue to keep you warm after it becomes wet; cotton will not.</p> <p>Use protective ointments such as sunscreen and chap stick, as appropriate to the field conditions.</p> <p>Stay hydrated in hot weather; drink fluids regularly throughout the day, even if not thirsty.</p> <p>Recognize signs of heat stress; take frequent breaks in shade when working in direct sunlight for prolonged periods.</p> <p>Be familiar with Heat index chart - add 20 degrees to chart if fully clothed and if working in direct sunlight.</p> <p>NOTE: Unacceptable field work conditions are not precise, but may include site specific conditions, general location, extreme weather conditions (e.g., icing, lightning, excessive cold or wind), travel conditions, and other factors. Professional judgment is required, and personal assessment of safety must always be individually assessed.</p> |
|                                       | Working on Ice                                       | Assess relative load bearing capacity of ice on lakes, ponds and other waterways. If unsure do not venture onto the ice.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |





# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: General Outdoor Field Work**

**Analysis By: Anthony Zemba,  
CHMM**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: June 25, 2012**

**Date: June 25, 2012**

**Date: July 12, 2012**

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks                                | Potential Hazards       | Controls                                                                                                                                                                                                                                                                     |
|----------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              |                         | Wear proper footwear modified for traction on ice.                                                                                                                                                                                                                           |
|                                              | Electrical storms       | If lightning is observed during drilling activities, work shall be suspended immediately and employees shall find suitable shelter (building or vehicle at minimum). Work will commence no sooner than 30 minutes after the last indications of lightning have been observed |
|                                              |                         | Seek shelter inside a walled building or your vehicle.                                                                                                                                                                                                                       |
|                                              |                         | Open picnic pavilions and under trees are not adequate shelters.                                                                                                                                                                                                             |
|                                              |                         | Assess vulnerability to lightning strikes as soon as thunder is heard on the horizon. Open areas and higher elevations are more susceptible to strikes.                                                                                                                      |
|                                              |                         | Tall objects such as metal towers and flag poles may attract lightning.                                                                                                                                                                                                      |
|                                              |                         | Consult internet weather radar tracking devices to learn of impending storm patterns proximal to your work area.                                                                                                                                                             |
|                                              | High Winds              | Avoid working at high elevations, elevated platforms, and other exposed areas during high wind conditions.                                                                                                                                                                   |
|                                              |                         | Assess work area for equipment that may be blown down, over, or carried aloft by high winds.                                                                                                                                                                                 |
| Working in areas without sanitary facilities | Hygiene related hazards | Provide hand washing kits (e.g., baby wipes, hand sanitizers, paper towels, bottled water, etc.) to be used prior to eating and drinking.                                                                                                                                    |
|                                              |                         | Have garbage bags handy to collect trash.                                                                                                                                                                                                                                    |
| Working in remote areas                      | Emergency Conditions    | Be familiar with onsite emergency procedures and route to nearest hospital.                                                                                                                                                                                                  |
|                                              |                         | Have a first aid kit available; know its contents and how to use them.                                                                                                                                                                                                       |
|                                              |                         | Carry a cell phone during all field work for emergency purposes, and confirm the nearest location of cell phone signal on site prior to start of worksite.                                                                                                                   |
|                                              | Disorientation          | Plan your route and anticipated progress prior to field work.                                                                                                                                                                                                                |



# GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

**Job: General Outdoor Field Work**

**Analysis By: Anthony Zemba,  
CHMM**

**Reviewed By: Guy Dalton**

**Approved By: Jayanti Chatterjee , CIH**

**Date: June 25, 2012**

**Date: June 25, 2012**

**Date: July 12, 2012**

## Task 21.1 General Outdoor Field Work

### HAZARD CONTROLS

| GZA Job Tasks | Potential Hazards | Controls                                                                                                                                                                                                     |
|---------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                   | Have multiple navigation aids (e.g., USGS Map, compass, GPS, etc.) and know how to use them before entering field. Remember to have charged batteries and battery back-ups for electronic devices.           |
|               |                   | Share your progress plan with office staff prior to entering the field.                                                                                                                                      |
|               |                   | Check in with office personnel periodically to update progress.                                                                                                                                              |
|               |                   | Review and comply with GZA's Working Alone Policy 03-1009 in advance of working alone on a project site.                                                                                                     |
|               | Hunting           | Be familiar with the various game hunting seasons. Follow rules and guidelines for remaining visible to hunters.<br>Try to plan work around active hunting seasons or daily peak hunting hours as warranted. |



**ATTACHMENT - D**  
**ACCIDENT AND INJURY REPORT FORM**

## SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Injured Employee \_\_\_\_\_ Job Title \_\_\_\_\_

Home Office \_\_\_\_\_ Division/Department \_\_\_\_\_

Date/Time of Accident \_\_\_\_\_

Location of Accident \_\_\_\_\_

Witnesses to the Accident \_\_\_\_\_

Injury Incurred? \_\_\_\_\_ Nature of Injury \_\_\_\_\_

\_\_\_\_\_

Engaged in What Task When Injured? \_\_\_\_\_

\_\_\_\_\_

Will Lost Time Occur? \_\_\_\_ How Long? \_\_\_\_\_ Date Lost Time Began \_\_\_\_\_

Were Other Persons Involved/Injured? \_\_\_\_\_

\_\_\_\_\_

How Did the Accident Occur? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What Could Be Done to Prevent Recurrence of the Accident? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What Actions Have You Taken Thus Far to Prevent Recurrence? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Supervisor's Signature \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

Reviewer's Signature \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_

**Note: If the space provided on this form is insufficient, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Health and Safety Manager within two days of the occurrence of the accident.**



**ATTACHMENT - E**  
**SAFETY DATA SHEETS**

# SAFETY DATA SHEET



Acetone

## Section 1. Identification

|                                                             |                                                                                                                               |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>GHS product identifier</b>                               | : Acetone                                                                                                                     |
| <b>Chemical name</b>                                        | : acetone                                                                                                                     |
| <b>Other means of identification</b>                        | : propan-2-one; propanone; 2-Propanone; dimethyl ketone                                                                       |
| <b>Product use</b>                                          | : Synthetic/Analytical chemistry.                                                                                             |
| <b>Synonym</b>                                              | : propan-2-one; propanone; 2-Propanone; dimethyl ketone                                                                       |
| <b>SDS #</b>                                                | : 001088                                                                                                                      |
| <b>Supplier's details</b>                                   | : Airgas USA, LLC and its affiliates<br>259 North Radnor-Chester Road<br>Suite 100<br>Radnor, PA 19087-5283<br>1-610-687-5253 |
| <b>Emergency telephone number (with hours of operation)</b> | : 1-866-734-3438                                                                                                              |

## Section 2. Hazards identification

|                                                   |                                                                                                                                                                         |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OSHA/HCS status</b>                            | : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).                                                                   |
| <b>Classification of the substance or mixture</b> | : FLAMMABLE LIQUIDS - Category 2<br>SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2<br>SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3 |

### GHS label elements

**Hazard pictograms**



**Signal word**

: Danger

**Hazard statements**

: Highly flammable liquid and vapor.  
May form explosive mixtures with air.  
Causes serious eye irritation.  
May cause drowsiness and dizziness.

### Precautionary statements

**General**

: Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention**

: Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing vapor. Wash hands thoroughly after handling.

**Date of issue/Date of revision**

: 4/26/2015.

**Date of previous issue**

: 10/21/2014.

**Version** : 0.02

1/14

## Section 2. Hazards identification

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Response</b>                         | : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. |
| <b>Storage</b>                          | : Store locked up. Store in a well-ventilated place. Keep cool.                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Disposal</b>                         | : Dispose of contents and container in accordance with all local, regional, national and international regulations.                                                                                                                                                                                                                                                                                                                                 |
| <b>Hazards not otherwise classified</b> | : None known.                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Section 3. Composition/information on ingredients

|                                      |                                                         |
|--------------------------------------|---------------------------------------------------------|
| <b>Substance/mixture</b>             | : Substance                                             |
| <b>Chemical name</b>                 | : acetone                                               |
| <b>Other means of identification</b> | : propan-2-one; propanone; 2-Propanone; dimethyl ketone |

### CAS number/other identifiers

|                     |           |
|---------------------|-----------|
| <b>CAS number</b>   | : 67-64-1 |
| <b>Product code</b> | : 001088  |

| <b>Ingredient name</b> | <b>%</b> | <b>CAS number</b> |
|------------------------|----------|-------------------|
| acetone                | 100      | 67-64-1           |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Inhalation</b>   | : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |
| <b>Skin contact</b> | : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ingestion</b>    | : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention.                   |

## Section 4. First aid measures

immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

#### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any



## Section 5. Fire-fighting measures

- waterway, sewer or drain.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide
- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking

## Section 7. Handling and storage

### Advice on general occupational hygiene

tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

### Conditions for safe storage, including any incompatibilities

- : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| acetone         | <p><b>ACGIH TLV (United States, 3/2012).</b><br/>           STEL: 1782 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 750 ppm 15 minutes.<br/>           TWA: 1188 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 500 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 1/2013).</b><br/>           TWA: 590 mg/m<sup>3</sup> 10 hours.<br/>           TWA: 250 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6/2010).</b><br/>           TWA: 2400 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 1000 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b><br/>           STEL: 2400 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 1000 ppm 15 minutes.<br/>           TWA: 1800 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 750 ppm 8 hours.</p> |

### Appropriate engineering controls

- : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

### Environmental exposure controls

- : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

## Section 8. Exposure controls/personal protection

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid. [COLORLESS LIQUID WITH A FRAGRANT, MINT-LIKE ODOR]
- Color** : Colorless.
- Molecular weight** : 58.09 g/mole
- Molecular formula** : C<sub>3</sub>H<sub>6</sub>O
- Boiling/condensation point** : 56.05°C (132.9°F)
- Melting/freezing point** : -94.7°C (-138.5°F)
- Critical temperature** : 234.85°C (454.7°F)
- Odor** : Characteristic.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Closed cup: -20°C (-4°F)
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : 6.06 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 2.5%  
Upper: 13%
- Vapor pressure** : 24 kPa (180.014626188 mm Hg) [room temperature]

## Section 9. Physical and chemical properties

|                                        |                  |
|----------------------------------------|------------------|
| Vapor density                          | : 2 (Air = 1)    |
| Specific Volume (ft <sup>3</sup> /lb)  | : 1.2642         |
| Gas Density (lb/ft <sup>3</sup> )      | : 0.791          |
| Relative density                       | : 0.8            |
| Solubility                             | : Not available. |
| Solubility in water                    | : Not available. |
| Partition coefficient: n-octanol/water | : -0.23          |
| Auto-ignition temperature              | : 465°C (869°F)  |
| Decomposition temperature              | : Not available. |
| SADT                                   | : Not available. |
| Viscosity                              | : Not available. |

## Section 10. Stability and reactivity

|                                         |                                                                                                                                                                                                                                      |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reactivity                              | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| Chemical stability                      | : The product is stable.                                                                                                                                                                                                             |
| Possibility of hazardous reactions      | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| Conditions to avoid                     | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |
| Incompatibility with various substances | : Extremely reactive or incompatible with the following materials: oxidizing materials.                                                                                                                                              |
| Hazardous decomposition products        | : Under normal conditions of storage and use, hazardous decomposition products should not be produced.                                                                                                                               |
| Hazardous polymerization                | : Under normal conditions of storage and use, hazardous polymerization will not occur.                                                                                                                                               |

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/ingredient name | Result                             | Species    | Dose                    | Exposure     |
|-------------------------|------------------------------------|------------|-------------------------|--------------|
| acetone                 | LC50 Inhalation Vapor<br>LD50 Oral | Rat<br>Rat | 59528 ppm<br>5800 mg/kg | 1 hours<br>- |

#### Irritation/Corrosion

## Section 11. Toxicological information

| Product/ingredient name | Result                   | Species | Score | Exposure                 | Observation |
|-------------------------|--------------------------|---------|-------|--------------------------|-------------|
| acetone                 | Eyes - Mild irritant     | Human   | -     | 186300 parts per million | -           |
|                         | Eyes - Mild irritant     | Rabbit  | -     | 10 microliters           | -           |
|                         | Eyes - Moderate irritant | Rabbit  | -     | 24 hours 20 milligrams   | -           |
|                         | Eyes - Severe irritant   | Rabbit  | -     | 20 milligrams            | -           |
|                         | Skin - Mild irritant     | Rabbit  | -     | 24 hours 500 milligrams  | -           |
|                         | Skin - Mild irritant     | Rabbit  | -     | 395 milligrams           | -           |

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

| Name    | Category   | Route of exposure | Target organs    |
|---------|------------|-------------------|------------------|
| acetone | Category 3 | Not applicable.   | Narcotic effects |

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

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

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness

## Section 11. Toxicological information

|                     |                                                                                                                                               |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Inhalation</b>   | : Adverse symptoms may include the following:<br>nausea or vomiting<br>headache<br>drowsiness/fatigue<br>dizziness/vertigo<br>unconsciousness |
| <b>Skin contact</b> | : No specific data.                                                                                                                           |
| <b>Ingestion</b>    | : No specific data.                                                                                                                           |

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Long term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Potential chronic health effects

Not available.

|                              |                                                     |
|------------------------------|-----------------------------------------------------|
| <b>General</b>               | : No known significant effects or critical hazards. |
| <b>Carcinogenicity</b>       | : No known significant effects or critical hazards. |
| <b>Mutagenicity</b>          | : No known significant effects or critical hazards. |
| <b>Teratogenicity</b>        | : No known significant effects or critical hazards. |
| <b>Developmental effects</b> | : No known significant effects or critical hazards. |
| <b>Fertility effects</b>     | : No known significant effects or critical hazards. |

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

| Product/ingredient name | Result                              | Species                                                                | Exposure |
|-------------------------|-------------------------------------|------------------------------------------------------------------------|----------|
| acetone                 | Acute EC50 20.565 mg/l Marine water | Algae - Ulva pertusa                                                   | 96 hours |
|                         | Acute LC50 6000000 µg/l Fresh water | Crustaceans - Gammarus pulex                                           | 48 hours |
|                         | Acute LC50 10000 µg/l Fresh water   | Daphnia - Daphnia magna                                                | 48 hours |
|                         | Acute LC50 100 mg/l Fresh water     | Fish - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) | 96 hours |
|                         | Chronic NOEC 4.95 mg/l Marine water | Algae - Ulva pertusa                                                   | 96 hours |
|                         | Chronic NOEC 0.1 ml/L Fresh water   | Daphnia - Daphnia magna - Neonate                                      | 21 days  |

### Persistence and degradability

Not available.

## Section 12. Ecological information

### Bioaccumulative potential

| Product/ingredient name | LogP <sub>ow</sub> | BCF | Potential |
|-------------------------|--------------------|-----|-----------|
| acetone                 | -0.23              | -   | low       |

### Mobility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

### United States - RCRA Toxic hazardous waste "U" List

| Ingredient                   | CAS #   | Status | Reference number |
|------------------------------|---------|--------|------------------|
| Acetone (I); 2-Propanone (I) | 67-64-1 | Listed | U002             |

## Section 14. Transport information

|                            | DOT                                                                                      | TDG                                                                                      | Mexico                                                                                   | IMDG                                                                                       | IATA                                                                                       |
|----------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| UN number                  | UN1090                                                                                   | UN1090                                                                                   | UN1090                                                                                   | UN1090                                                                                     | UN1090                                                                                     |
| UN proper shipping name    | ACETONE                                                                                  | ACETONE                                                                                  | ACETONE                                                                                  | ACETONE (ACETONE SOLUTIONS)                                                                | ACETONE                                                                                    |
| Transport hazard class(es) | 3<br> | 3<br> | 3<br> | 3<br> | 3<br> |
| Packing group              | II                                                                                       | II                                                                                       | -                                                                                        | II                                                                                         | II                                                                                         |
| Environment                | No.                                                                                      | No.                                                                                      | No.                                                                                      | No.                                                                                        | No.                                                                                        |
|                            |                                                                                          |                                                                                          |                                                                                          |                                                                                            |                                                                                            |

Date of issue/Date of revision : 4/26/2015. Date of previous issue : 10/21/2014. Version : 0.02 10/14

## Section 14. Transport information

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                          |   |   |                                                                                                                                                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Additional information</b> | <b>Reportable quantity</b><br>5000 lbs / 2270 kg [758.12 gal / 2869.8 L]<br>Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.<br><br><b>Limited quantity</b><br>Yes.<br><br><b>Packaging instruction</b><br><b>Passenger aircraft</b><br>Quantity limitation: 5 L<br><br><b>Cargo aircraft</b><br>Quantity limitation: 60 L<br><br><b>Special provisions</b><br>IB2, T4, TP1 | <b>Explosive Limit and Limited Quantity Index</b><br>1<br><br><b>Passenger Carrying Ship Index</b><br>Forbidden<br><br><b>Passenger Carrying Road or Rail Index</b><br>5 | - | - | <b>Passenger and Cargo Aircraft</b> Quantity limitation: 5 L<br><b>Cargo Aircraft Only Limited Quantities - Passenger Aircraft</b> Quantity limitation: 1 L |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined  
**United States inventory (TSCA 8b):** This material is listed or exempted.

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Listed

### SARA 302/304

#### Composition/information on ingredients

No products were found.

**SARA 304 RQ** : Not applicable.

### SARA 311/312



## Section 15. Regulatory information

**Classification** : Fire hazard  
Immediate (acute) health hazard

### Composition/information on ingredients

| Name    | %   | Fire hazard | Sudden release of pressure | Reactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|---------|-----|-------------|----------------------------|----------|---------------------------------|---------------------------------|
| acetone | 100 | Yes.        | No.                        | No.      | Yes.                            | No.                             |

### State regulations

**Massachusetts** : This material is listed.  
**New York** : This material is listed.  
**New Jersey** : This material is listed.  
**Pennsylvania** : This material is listed.  
**Canada inventory** : This material is listed or exempted.

### International regulations

**International lists** : **Australia inventory (AICS)**: This material is listed or exempted.  
**China inventory (IECSC)**: This material is listed or exempted.  
**Japan inventory**: This material is listed or exempted.  
**Korea inventory**: This material is listed or exempted.  
**Malaysia Inventory (EHS Register)**: Not determined.  
**New Zealand Inventory of Chemicals (NZIoC)**: This material is listed or exempted.  
**Philippines inventory (PICCS)**: This material is listed or exempted.  
**Taiwan inventory (CSNN)**: Not determined.

**Chemical Weapons Convention List Schedule I Chemicals** : Not listed

**Chemical Weapons Convention List Schedule II Chemicals** : Not listed

**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

### Canada

**WHMIS (Canada)** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).  
**CEPA Toxic substances**: This material is listed.  
**Canadian ARET**: This material is not listed.  
**Canadian NPRI**: This material is listed.  
**Alberta Designated Substances**: This material is not listed.  
**Ontario Designated Substances**: This material is not listed.  
**Quebec Designated Substances**: This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous Material Information System (U.S.A.)

|              |   |   |
|--------------|---|---|
| Health       | * | 2 |
| Flammability |   | 3 |

## Section 16. Other information

### Physical hazards

0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of printing               | : 4/26/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Date of issue/Date of revision | : 4/26/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Date of previous issue         | : 10/21/2014.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Version                        | : 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Key to abbreviations           | : ATE = Acute Toxicity Estimate<br>BCF = Bioconcentration Factor<br>GHS = Globally Harmonized System of Classification and Labelling of Chemicals<br>IATA = International Air Transport Association<br>IBC = Intermediate Bulk Container<br>IMDG = International Maritime Dangerous Goods<br>LogPow = logarithm of the octanol/water partition coefficient<br>MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)<br>UN = United Nations<br>ACGIH – American Conference of Governmental Industrial Hygienists<br>AIHA – American Industrial Hygiene Association<br>CAS – Chemical Abstract Services<br>CEPA – Canadian Environmental Protection Act<br>CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)<br>CFR – United States Code of Federal Regulations<br>CPR – Controlled Products Regulations<br>DSL – Domestic Substances List<br>GWP – Global Warming Potential<br>IARC – International Agency for Research on Cancer<br>ICAO – International Civil Aviation Organisation<br>Inh – Inhalation<br>LC – Lethal concentration |

## Section 16. Other information

LD – Lethal dosage  
NDSL – Non-Domestic Substances List  
NIOSH – National Institute for Occupational Safety and Health  
TDG – Canadian Transportation of Dangerous Goods Act and Regulations  
TLV – Threshold Limit Value  
TSCA – Toxic Substances Control Act  
WEEL – Workplace Environmental Exposure Level  
WHMIS – Canadian Workplace Hazardous Material Information System

### References

: Not available.

Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

# SAFETY DATA SHEET



Ethanol

## Section 1. Identification

|                                                             |                                                                                                                               |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>GHS product identifier</b>                               | : Ethanol                                                                                                                     |
| <b>Chemical name</b>                                        | : ethanol                                                                                                                     |
| <b>Other means of identification</b>                        | : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)                                                          |
| <b>Product use</b>                                          | : Synthetic/Analytical chemistry.                                                                                             |
| <b>Synonym</b>                                              | : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)                                                          |
| <b>SDS #</b>                                                | : 001114                                                                                                                      |
| <b>Supplier's details</b>                                   | : Airgas USA, LLC and its affiliates<br>259 North Radnor-Chester Road<br>Suite 100<br>Radnor, PA 19087-5283<br>1-610-687-5253 |
| <b>Emergency telephone number (with hours of operation)</b> | : 1-866-734-3438                                                                                                              |

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : FLAMMABLE LIQUIDS - Category 2

### GHS label elements

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : Highly flammable liquid and vapor.  
May form explosive mixtures with air.

### Precautionary statements

**General** : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention** : Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use and store only outdoors or in a well ventilated place.

**Response** : IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

**Storage** : Store in a well-ventilated place. Keep cool.

**Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Hazards not otherwise classified** : None known.

**Date of issue/Date of revision**

: 5/18/2015.

**Date of previous issue**

: 10/28/2014.

**Version** : 0.02

1/12

## Section 3. Composition/information on ingredients

**Substance/mixture** : Substance  
**Chemical name** : ethanol  
**Other means of identification** : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)

### CAS number/other identifiers

**CAS number** : 64-17-5  
**Product code** : 001114

| Ingredient name | %   | CAS number |
|-----------------|-----|------------|
| ethanol         | 100 | 64-17-5    |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

**Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.  
**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.  
**Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.  
**Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

#### Potential acute health effects

**Eye contact** : No known significant effects or critical hazards.  
**Inhalation** : No known significant effects or critical hazards.  
**Skin contact** : No known significant effects or critical hazards.  
**Frostbite** : Try to warm up the frozen tissues and seek medical attention.  
**Ingestion** : No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

**Eye contact** : No specific data.

## Section 4. First aid measures

- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flames, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

## Section 6. Accidental release measures

### Methods and materials for containment and cleaning up

#### Small spill

- : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

#### Large spill

- : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

#### Protective measures

- : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

#### Advice on general occupational hygiene

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

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

- : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ethanol         | <b>ACGIH TLV (United States, 3/2012).</b><br>STEL: 1000 ppm 15 minutes.<br><b>OSHA PEL 1989 (United States, 3/1989).</b><br>TWA: 1000 ppm 8 hours.<br>TWA: 1900 mg/m <sup>3</sup> 8 hours.<br><b>NIOSH REL (United States, 1/2013).</b><br>TWA: 1000 ppm 10 hours.<br>TWA: 1900 mg/m <sup>3</sup> 10 hours. |



## Section 8. Exposure controls/personal protection

**OSHA PEL (United States, 6/2010).**

TWA: 1000 ppm 8 hours.

TWA: 1900 mg/m<sup>3</sup> 8 hours.

**Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

### Skin protection

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

**Physical state** : Liquid. [CLEAR, COLORLESS LIQUID WITH A WEAK, ETHEREAL, VINOUS ODOR]

**Color** : Colorless. Clear.

**Molecular weight** : 46.08 g/mole

**Molecular formula** : C<sub>2</sub>H<sub>6</sub>O

**Boiling/condensation point** : 78.29°C (172.9°F)

**Date of issue/Date of revision**

: 5/18/2015.

**Date of previous issue**

: 10/28/2014.

**Version** : 0.02

5/12



## Section 9. Physical and chemical properties

|                                                     |                                                                      |
|-----------------------------------------------------|----------------------------------------------------------------------|
| <b>Melting/freezing point</b>                       | : -114°C (-173.2°F)                                                  |
| <b>Critical temperature</b>                         | : Not available.                                                     |
| <b>Odor</b>                                         | : Characteristic.                                                    |
| <b>Odor threshold</b>                               | : Not available.                                                     |
| <b>pH</b>                                           | : Not available.                                                     |
| <b>Flash point</b>                                  | : Closed cup: 9.7°C (49.5°F)                                         |
| <b>Burning time</b>                                 | : Not applicable.                                                    |
| <b>Burning rate</b>                                 | : Not applicable.                                                    |
| <b>Evaporation rate</b>                             | : 1.7 (butyl acetate = 1)                                            |
| <b>Flammability (solid, gas)</b>                    | : Not available.                                                     |
| <b>Lower and upper explosive (flammable) limits</b> | : Lower: 3.3%<br>Upper: 19%                                          |
| <b>Vapor pressure</b>                               | : 5.7 kPa (42.948650611 mm Hg) [room temperature]                    |
| <b>Vapor density</b>                                | : 1.6 (Air = 1)                                                      |
| <b>Specific Volume (ft<sup>3</sup>/lb)</b>          | : 1.2716                                                             |
| <b>Gas Density (lb/ft<sup>3</sup>)</b>              | : 0.7864 (25°C / 77 to °F)                                           |
| <b>Relative density</b>                             | : 0.8                                                                |
| <b>Solubility</b>                                   | : Not available.                                                     |
| <b>Solubility in water</b>                          | : 1000 g/l                                                           |
| <b>Partition coefficient: n-octanol/water</b>       | : -0.35                                                              |
| <b>Auto-ignition temperature</b>                    | : 455°C (851°F)                                                      |
| <b>Decomposition temperature</b>                    | : Not available.                                                     |
| <b>SADT</b>                                         | : Not available.                                                     |
| <b>Viscosity</b>                                    | : Dynamic (room temperature): 0.544 to 0.59 mPa·s (0.544 to 0.59 cP) |

## Section 10. Stability and reactivity

|                                                |                                                                                                                                                                                                                                      |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reactivity</b>                              | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| <b>Chemical stability</b>                      | : The product is stable.                                                                                                                                                                                                             |
| <b>Possibility of hazardous reactions</b>      | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| <b>Conditions to avoid</b>                     | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |
| <b>Incompatibility with various substances</b> | : Highly reactive or incompatible with the following materials: oxidizing materials and alkalis.                                                                                                                                     |
| <b>Hazardous decomposition products</b>        | : Under normal conditions of storage and use, hazardous decomposition products should not be produced.                                                                                                                               |
| <b>Hazardous polymerization</b>                | : Under normal conditions of storage and use, hazardous polymerization will not occur.                                                                                                                                               |

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Not available.

#### Irritation/Corrosion

Not available.

#### Sensitization

Not available.

#### Mutagenicity

Not available.

#### Carcinogenicity

Not available.

#### Reproductive toxicity

Not available.

#### Teratogenicity

Not available.

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

Not available.

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

Not available.

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

|                     |                                                     |
|---------------------|-----------------------------------------------------|
| <b>Eye contact</b>  | : No known significant effects or critical hazards. |
| <b>Inhalation</b>   | : No known significant effects or critical hazards. |
| <b>Skin contact</b> | : No known significant effects or critical hazards. |
| <b>Ingestion</b>    | : No known significant effects or critical hazards. |

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

|                     |                     |
|---------------------|---------------------|
| <b>Eye contact</b>  | : No specific data. |
| <b>Inhalation</b>   | : No specific data. |
| <b>Skin contact</b> | : No specific data. |
| <b>Ingestion</b>    | : No specific data. |

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

#### Long term exposure

## Section 11. Toxicological information

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

Not available.

### Persistence and degradability

Not available.

### Bioaccumulative potential

| Product/ingredient name | LogP <sub>ow</sub> | BCF | Potential |
|-------------------------|--------------------|-----|-----------|
| ethanol                 | -0.35              | -   | low       |

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere

## Section 13. Disposal considerations

inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                                   | DOT                                                                                                                                                                                                                                         | TDG                                                                                                                                                                                                                                     | Mexico                                                                                 | IMDG                                                                                     | IATA                                                                                                                                                                                            |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UN number</b>                  | UN1170                                                                                                                                                                                                                                      | UN1170                                                                                                                                                                                                                                  | UN1170                                                                                 | UN1170                                                                                   | UN1170                                                                                                                                                                                          |
| <b>UN proper shipping name</b>    | ETHANOL OR ETHYL ALCOHOL OR ETHANOL SOLUTIONS OR ETHYL ALCOHOL SOLUTIONS                                                                                                                                                                    | ETHANOL MORE THAN 24 PER CENT ETHANOL, BY VOLUME; ETHANOL SOLUTION MORE THAN 24 PER CENT ETHANOL, BY VOLUME; ETHYL ALCOHOL MORE THAN 24 PER CENT ETHANOL, BY VOLUME; OR ETHYL ALCOHOL SOLUTION MORE THAN 24 PER CENT ETHANOL, BY VOLUME | ETHANOL OR ETHYL ALCOHOL OR ETHANOL SOLUTIONS OR ETHYL ALCOHOL SOLUTIONS               | ETHANOL (ETHYL ALCOHOL) OR ETHANOL SOLUTION (ETHYL ALCOHOL SOLUTION)                     | ETHANOL                                                                                                                                                                                         |
| <b>Transport hazard class(es)</b> | 3<br>                                                                                                                                                      | 3<br>                                                                                                                                                  | 3<br> | 3<br> | 3<br>                                                                                                        |
| <b>Packing group</b>              | II                                                                                                                                                                                                                                          | II                                                                                                                                                                                                                                      | II                                                                                     | II                                                                                       | II                                                                                                                                                                                              |
| <b>Environment</b>                | No.                                                                                                                                                                                                                                         | No.                                                                                                                                                                                                                                     | No.                                                                                    | No.                                                                                      | No.                                                                                                                                                                                             |
| <b>Additional information</b>     | <u>Limited quantity</u><br>Yes.<br><br><u>Packaging instruction</u><br><b>Passenger aircraft</b><br>Quantity limitation: 5 L<br><br><b>Cargo aircraft</b><br>Quantity limitation: 60 L<br><br><u>Special provisions</u><br>24, IB2, T4, TP1 | <u>Explosive Limit and Limited Quantity Index</u><br>5<br><br><u>Passenger Carrying Road or Rail Index</u><br>60                                                                                                                        | -                                                                                      | -                                                                                        | <u>Passenger and Cargo Aircraft</u> Quantity limitation: 5 L<br><u>Cargo Aircraft Only</u> Quantity limitation: 60 L<br><u>Limited Quantities - Passenger Aircraft</u> Quantity limitation: 1 L |

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : TSCA 8(a) CDR Exempt/Partial exemption: Not determined  
 United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

### SARA 302/304

#### Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

### SARA 311/312

Classification : Fire hazard

#### Composition/information on ingredients

| Name    | %   | Fire hazard | Sudden release of pressure | Reactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|---------|-----|-------------|----------------------------|----------|---------------------------------|---------------------------------|
| ethanol | 100 | Yes.        | No.                        | No.      | No.                             | No.                             |

### State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

### International regulations

#### International lists

: **Australia inventory (AICS)**: This material is listed or exempted.

**China inventory (IECSC)**: This material is listed or exempted.

**Japan inventory**: This material is listed or exempted.

**Korea inventory**: This material is listed or exempted.

**Malaysia Inventory (EHS Register)**: Not determined.

**New Zealand Inventory of Chemicals (NZIoC)**: This material is listed or exempted.

**Philippines inventory (PICCS)**: This material is listed or exempted.

**Taiwan inventory (CSNN)**: Not determined.

Chemical Weapons : Not listed

Convention List Schedule I Chemicals

Chemical Weapons : Not listed

Convention List Schedule II Chemicals

## Section 15. Regulatory information

**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

### Canada

**WHMIS (Canada)** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).  
**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous Material Information System (U.S.A.)

|                  |   |
|------------------|---|
| Health           | 2 |
| Flammability     | 3 |
| Physical hazards | 0 |
|                  |   |

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

**Date of printing** : 5/18/2015.  
**Date of issue/Date of revision** : 5/18/2015.  
**Date of previous issue** : 10/28/2014.  
**Version** : 0.02

## Section 16. Other information

### Key to abbreviations

: ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations  
 ACGIH – American Conference of Governmental Industrial Hygienists  
 AIHA – American Industrial Hygiene Association  
 CAS – Chemical Abstract Services  
 CEPA – Canadian Environmental Protection Act  
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)  
 CFR – United States Code of Federal Regulations  
 CPR – Controlled Products Regulations  
 DSL – Domestic Substances List  
 GWP – Global Warming Potential  
 IARC – International Agency for Research on Cancer  
 ICAO – International Civil Aviation Organisation  
 Inh – Inhalation  
 LC – Lethal concentration  
 LD – Lethal dosage  
 NDSL – Non-Domestic Substances List  
 NIOSH – National Institute for Occupational Safety and Health  
 TDG – Canadian Transportation of Dangerous Goods Act and Regulations  
 TLV – Threshold Limit Value  
 TSCA – Toxic Substances Control Act  
 WEEL – Workplace Environmental Exposure Level  
 WHMIS – Canadian Workplace Hazardous Material Information System

### References

: Not available.

Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

# SAFETY DATA SHEET



N-Hexane

## Section 1. Identification

**GHS product identifier** : N-Hexane  
**Chemical name** : n-hexane  
**Other means of identification** : Hexane; Hexane (n-Hexane)  
**Product use** : Synthetic/Analytical chemistry.  
**Synonym** : Hexane; Hexane (n-Hexane)  
**SDS #** : 001060  
**Supplier's details** : Airgas USA, LLC and its affiliates  
259 North Radnor-Chester Road  
Suite 100  
Radnor, PA 19087-5283  
1-610-687-5253

**Emergency telephone number (with hours of operation)** : 1-866-734-3438

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : FLAMMABLE LIQUIDS - Category 2  
TOXIC TO REPRODUCTION (Fertility) - Category 2  
TOXIC TO REPRODUCTION (Unborn child) - Category 2  
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3  
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2  
AQUATIC HAZARD (LONG-TERM) - Category 2

### GHS label elements

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : Highly flammable liquid and vapor.  
May form explosive mixtures with air.  
Suspected of damaging fertility or the unborn child.  
May cause drowsiness and dizziness.  
May cause damage to organs through prolonged or repeated exposure.  
Toxic to aquatic life with long lasting effects.

### Precautionary statements

**General** : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Date of issue/Date of revision**

: 5/20/2015.

**Date of previous issue**

: 10/16/2014.

**Version** : 0.03

1/14



## Section 2. Hazards identification

- Precaution** : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe vapor. Wash hands thoroughly after handling.
- Response** : Collect spillage. Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
- Storage** : Store locked up. Store in a well-ventilated place. Keep cool.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : None known.

## Section 3. Composition/information on ingredients

- Substance/mixture** : Substance
- Chemical name** : n-hexane
- Other means of identification** : Hexane; Hexane (n-Hexane)

### CAS number/other identifiers

- CAS number** : 110-54-3
- Product code** : 001060

| Ingredient name | %   | CAS number |
|-----------------|-----|------------|
| n-hexane        | 100 | 110-54-3   |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention following exposure or if feeling unwell.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

## Section 4. First aid measures

- Skin contact** : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### - ost important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Causes eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach.

#### Other exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations
- Ingestion** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.

## Section 4. First aid measures

- Protection of first aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.

- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide

- Special protective actions for fire fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flames, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

### Methods and materials for containment and cleaning up

## Section 6. Accidental release measures

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

## Section 8. Exposure controls/personal protection

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n-hexane        | <p><b>ACGIH TLV (United States, 3<sup>rd</sup> 2012).</b><br/> <b>Absorbed through skin.</b><br/> TWA: 50 ppm 8 hours.</p> <p><b>MOSH / EL (United States, 1<sup>st</sup> 2013).</b><br/> TWA: 180 mg/m<sup>3</sup> 10 hours.<br/> TWA: 50 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6<sup>th</sup> 2010).</b><br/> TWA: 1800 mg/m<sup>3</sup> 8 hours.<br/> TWA: 500 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3<sup>rd</sup> 1989).</b><br/> TWA: 180 mg/m<sup>3</sup> 8 hours.<br/> TWA: 50 ppm 8 hours.</p> |

**Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

### Skin protection

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**/ Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

|                                              |                                                                                                      |
|----------------------------------------------|------------------------------------------------------------------------------------------------------|
| Physical state                               | : Liquid. [COLORLESS LIQUID WITH A MILD GASOLINE-LIKE ODOR]                                          |
| Color                                        | : Colorless.                                                                                         |
| - Molecular weight                           | : 86.18 g/mole                                                                                       |
| - Molecular formula                          | : C <sub>6</sub> H <sub>14</sub>                                                                     |
| Boiling/condensation point                   | : 68.73°C (155.7°F)                                                                                  |
| - Melting/freezing point                     | : -95.35°C (-139.6°F)                                                                                |
| Critical temperature                         | : 234.25°C (453.6°F)                                                                                 |
| Odor                                         | : Characteristic.                                                                                    |
| Odor threshold                               | : Not available.                                                                                     |
| pH                                           | : Not available.                                                                                     |
| Flash point                                  | : Closed cup: -22°C (-7.6°F)                                                                         |
| Burning time                                 | : Not applicable.                                                                                    |
| Burning rate                                 | : Not applicable.                                                                                    |
| Evaporation rate                             | : 6.82 (butyl acetate = 1)                                                                           |
| Flammability (solid, gas)                    | : Extremely flammable in the presence of the following materials or conditions: oxidizing materials. |
| Lower and upper explosive (flammable) limits | : Lower: 1.1%<br>Upper: 7.5%                                                                         |
| Vapor pressure                               | : 17 kPa (127.510360216 mm Hg) [room temperature]                                                    |
| Vapor density                                | : 3 (Air = 1)                                                                                        |
| Specific Volume (ft <sup>3</sup> /lb)        | : 1.5138                                                                                             |
| Gas Density (lb/ft <sup>3</sup> )            | : 0.6606 (25°C / 77 to °F)                                                                           |
| / Relative density                           | : 0.7                                                                                                |
| Solubility                                   | : Not available.                                                                                     |
| Solubility in water                          | : 0.0098 g/l                                                                                         |
| Partition coefficient: n-octanol/water       | : 4                                                                                                  |
| Autoignition temperature                     | : 225°C (437°F)                                                                                      |
| Decomposition temperature                    | : Not available.                                                                                     |
| SADT                                         | : Not available.                                                                                     |
| Viscosity                                    | : Dynamic (room temperature): 0.3 mPa·s (0.3 cP)                                                     |

## Section 10. Stability and reactivity

|                                    |                                                                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| / Reactivity                       | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| Chemical stability                 | : The product is stable.                                                                                                                                                                                                             |
| Possibility of hazardous reactions | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| Conditions to avoid                | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |

## Section 10. Stability and reactivity

**Incompatibility with Various substances** : Extremely reactive or incompatible with the following materials: oxidizing materials.

**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/ingredient name | Result                                                     | Species           | Dose                                  | Exposure                |
|-------------------------|------------------------------------------------------------|-------------------|---------------------------------------|-------------------------|
| n-hexane                | LC50 Inhalation Gas.<br>LC50 Inhalation Vapor<br>LD50 Oral | Rat<br>Rat<br>Rat | 48000 ppm<br>96000 ppm<br>15840 mg/kg | 4 hours<br>1 hours<br>- |

#### Irritation/Corrosion

| Product/ingredient name | Result               | Species | Score | Exposure      | Observation |
|-------------------------|----------------------|---------|-------|---------------|-------------|
| n-hexane                | Eyes - Mild irritant | Rabbit  | -     | 10 milligrams | -           |

#### Sensitization

Not available.

#### Mutagenicity

Not available.

#### Carcinogenicity

Not available.

#### Reproductive toxicity

Not available.

#### Teratogenicity

Not available.

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

| Name     | Category   | Route of exposure | Target organs    |
|----------|------------|-------------------|------------------|
| n-hexane | Category 3 | Not applicable.   | Narcotic effects |

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

| Name     | Category   | Route of exposure | Target organs  |
|----------|------------|-------------------|----------------|
| n-hexane | Category 2 | Not determined    | Not determined |

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

#### Potential acute health effects

Date of issue/Date of revision : 5/20/2015. Date of previous issue : 10/16/2014. Version : 0.03 8/14



## Section 11. Toxicological information

|                     |                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Causes eye irritation.                                                                             |
| <b>Inhalation</b>   | : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.             |
| <b>Skin contact</b> | : No known significant effects or critical hazards.                                                  |
| <b>Ingestion</b>    | : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach. |

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

|                     |                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Adverse symptoms may include the following:<br>irritation<br>watering<br>redness                                                                                                                                          |
| <b>Inhalation</b>   | : Adverse symptoms may include the following:<br>nausea or vomiting<br>headache<br>drowsiness/fatigue<br>dizziness/vertigo<br>unconsciousness<br>reduced fetal weight<br>increase in fetal deaths<br>skeletal malformations |
| <b>Skin contact</b> | : Adverse symptoms may include the following:<br>reduced fetal weight<br>increase in fetal deaths<br>skeletal malformations                                                                                                 |
| <b>Ingestion</b>    | : Adverse symptoms may include the following:<br>reduced fetal weight<br>increase in fetal deaths<br>skeletal malformations                                                                                                 |

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Long term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Potential chronic health effects

Not available.

|                              |                                                                      |
|------------------------------|----------------------------------------------------------------------|
| <b>General</b>               | : May cause damage to organs through prolonged or repeated exposure. |
| <b>Carcinogenicity</b>       | : No known significant effects or critical hazards.                  |
| <b>- utagenicity</b>         | : No known significant effects or critical hazards.                  |
| <b>Teratogenicity</b>        | : No known significant effects or critical hazards.                  |
| <b>DeRelopmental effects</b> | : No known significant effects or critical hazards.                  |
| <b>Fertility effects</b>     | : Suspected of damaging fertility.                                   |

### Numerical measures of toxicity

#### Acute toxicity estimates



## Section 11. Toxicological information

Not available.

## Section 12. Ecological information

### Toxicity

| Product/ingredient name | Test result                        | Species                        | Exposure |
|-------------------------|------------------------------------|--------------------------------|----------|
| n-hexane                | Acute LC50 113000 µg/l Fresh water | Fish - Oreochromis mossambicus | 96 hours |

### Persistence and degradability

Not available.

### Bioaccumulation potential

| Product/ingredient name | LogP <sub>ow</sub> | BCF     | Potential |
|-------------------------|--------------------|---------|-----------|
| n-hexane                | 4                  | 501.187 | high      |

### Volatility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                            | DOT                                                                                      | TDG                                                                                      | ADR 83/03                                                                                | I- DG                                                                                                                                                                            | IATA                                                                                       |
|----------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| UN number                  | UN1208                                                                                   | UN1208                                                                                   | UN1208                                                                                   | UN1208                                                                                                                                                                           | UN1208                                                                                     |
| Proper shipping name       | Hexanes                                                                                  | Hexanes                                                                                  | Hexanes                                                                                  | Hexanes                                                                                                                                                                          | Hexanes                                                                                    |
| Transport hazard class(es) | 3<br> | 3<br> | 3<br> | 3<br>  | 3<br> |

Date of issue/Date of revision : 5/20/2015. Date of previous issue : 10/16/2014. Version : 0.03 10/14

## Section 14. Transport information

| Packing group                 | II                                                                                                                                                                                                                                     | II                                                                                                                                                                          | II  | II                                                                                    | II                                                                                                       |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Environment                   | No.                                                                                                                                                                                                                                    | No.                                                                                                                                                                         | No. | Yes.                                                                                  | No.                                                                                                      |
| <b>Additional information</b> | <u>Reportable quantity</u><br>5000 lbs / 2270 kg [907.185 kg / 3436.3 L]<br>Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. | <u>Explosive Limit and Limited Quantity Index</u><br>1<br><br><u>Passenger Carrying Ship Index</u><br>Forbidden<br><br><u>Passenger Carrying / Load or / Ail Index</u><br>5 | -   | The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg. | The environmentally hazardous substance mark may appear if required by other transportation regulations. |

“Refer to CF/ 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of - A/ POL 73/8 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : TSCA 8(a) CD/ Exempt Partial exemption: Not determined  
 United States inventory (TSCA 8b): This material is listed or exempted.

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

**SA/ A 302/804**

Composition information on ingredients

No products were found.

**SA/ A 304 / Q** : Not applicable.

**SA/ A 311/812**

**Classification** : Fire hazard  
 Immediate (acute) health hazard  
 Delayed (chronic) health hazard

Composition information on ingredients

## Section 15. / egulatory information

| Name     | %   | Fire hazard | Sudden release of pressure | / eactiRe | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|----------|-----|-------------|----------------------------|-----------|---------------------------------|---------------------------------|
| n-hexane | 100 | Yes.        | No.                        | No.       | Yes.                            | Yes.                            |

### SA/ A 313

|                                 | Product name | CAS number | %   |
|---------------------------------|--------------|------------|-----|
| Form / N/ eporting requirements | n-hexane     | 110-54-3   | 100 |
| Supplier notification           | n-hexane     | 110-54-3   | 100 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

### State regulations

- assachusetts : This material is listed.
- Mew York : This material is listed.
- Mew Jersey : This material is listed.
- PennsylRania : This material is listed.
- Canada inRentory : This material is listed or exempted.

### International regulations

- International lists : **Australia inRentory (AICS)**: This material is listed or exempted.
- China inRentory (IECSC)**: This material is listed or exempted.
- Japan inRentory**: This material is listed or exempted.
- Korea inRentory**: This material is listed or exempted.
- alaysia inRentory (EHS / egister): Not determined.
- Mew Zealand InRentory of Chemicals (MZIoC)**: This material is listed or exempted.
- Philippines inRentory (PICCS)**: This material is listed or exempted.
- Taiwan inRentory (CSMM)**: Not determined.

Chemical Weapons : Not listed

ConRention List Schedule I Chemicals

Chemical Weapons : Not listed

ConRention List Schedule II Chemicals

Chemical Weapons : Not listed

ConRention List Schedule III Chemicals

### Canada

- WH- IS (Canada) : Class B-2: Flammable liquid
- Class D-2A: Material causing other toxic effects (Very toxic).
- Class D-2B: Material causing other toxic effects (Toxic).
- CEPA Toxic substances**: This material is not listed.
- Canadian A/ ET**: This material is not listed.
- Canadian MP/ I**: This material is listed.
- Alberta Designated Substances**: This material is not listed.
- Ontario Designated Substances**: This material is not listed.
- Quebec Designated Substances**: This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
 Class D-2A: Material causing other toxic effects (Very toxic).  
 Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous - aterial Information System (U.S.A.)

|                  |   |   |
|------------------|---|---|
| Health           | * | 2 |
| Flammability     |   | 3 |
| Physical hazards |   | 0 |
|                  |   |   |

Caution: H- IS® ratings are based on a 0N rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although H- IS® ratings are not required on SDSs under 29 CF/ 1910.1200, the preparer may choose to provide them. H- IS® ratings are to be used with a fully implemented H- IS® program. H- IS® is a registered mark of the National Paint & Coatings Association (MPCA). H- IS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



/ eprinted with permission from MFPA 704-2001, Identification of the Hazards of - aterials for Emergency / esponse Copyright ©1997, National Fire Protection Association, Quincy, - A 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, - A 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in MFPA 49 and MFPA 325, which would be used as a guideline only. Whether the chemicals are classified by MFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

**Date of printing** : 5/20/2015.

**Date of issue/Date of revision** : 5/20/2015.

**Date of previous issue** : 10/16/2014.

**Version** : 0.03

**Key to abbreviations** : ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations  
 ACGIH – American Conference of Governmental Industrial Hygienists  
 AIHA – American Industrial Hygiene Association  
 CAS – Chemical Abstract Services  
 CEPA – Canadian Environmental Protection Act  
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)

**Date of issue/Date of revision** : 5/20/2015. **Date of previous issue** : 10/16/2014. **Version** : 0.03 13/14

## Section 16. Other information

CFR – United States Code of Federal Regulations  
 CPR – Controlled Products Regulations  
 DSL – Domestic Substances List  
 GWP – Global Warming Potential  
 IARC – International Agency for Research on Cancer  
 ICAO – International Civil Aviation Organisation  
 Inh – Inhalation  
 LC – Lethal concentration  
 LD – Lethal dosage  
 NDSL – Non-Domestic Substances List  
 NIOSH – National Institute for Occupational Safety and Health  
 TDG – Canadian Transportation of Dangerous Goods Act and Regulations  
 TLV – Threshold Limit Value  
 TSCA – Toxic Substances Control Act  
 WEEL – Workplace Environmental Exposure Level  
 WHMIS – Canadian Workplace Hazardous Material Information System

### [References](#)

: Not available.

Indicates information that has changed from previously issued version.

### [Notice to reader](#)

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

# SAFETY DATA SHEET



Isopropyl Alcohol (Isopropanol)

## Section 1. Identification

**GHS product identifier** : Isopropyl Alcohol (Isopropanol)  
**Chemical name** : Isopropyl alcohol  
**Other means of identification** : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol  
**Product use** : Synthetic/Analytical chemistry.  
**Synonym** : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol  
**SDS #** : 001105  
**Supplier's details** : Airgas USA, LLC and its affiliates  
259 North Radnor-Chester Road  
Suite 100  
Radnor, PA 19087-5283  
1-610-687-5253

**Emergency telephone number (with hours of operation)** : 1-866-734-3438

## Section 2. Hazards identification

**OSHA/NIOSH status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : FLAMMABLE LIQUIDS - Category 2  
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2  
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3

### GHS label elements

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : Highly flammable liquid and vapor.  
May form explosive mixtures with air.  
Causes serious eye irritation.  
May cause drowsiness and dizziness.

### Precautionary statements

**General** : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention** : Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling. Use and store only outdoors or in a well ventilated place.

**Date of issue/Date of revision**

: 5/20/2015.

**Date of previous issue**

: 10/28/2014.

**Version** : 0.02

1/14

## Section 2. Hazards identification

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>/ response</b>                       | : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. |
| <b>Storage</b>                          | : Store locked up. Store in a well-ventilated place. Keep cool.                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Disposal</b>                         | : Dispose of contents and container in accordance with all local, regional, national and international regulations.                                                                                                                                                                                                                                                                                                                                 |
| <b>Hazards not otherwise classified</b> | : None known.                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Section 3. Composition and information on ingredients

|                                      |                                                           |
|--------------------------------------|-----------------------------------------------------------|
| <b>Substance/mixture</b>             | : Substance                                               |
| <b>Chemical name</b>                 | : Isopropyl alcohol                                       |
| <b>Other means of identification</b> | : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol |

### CAS number and other identifiers

|                     |           |
|---------------------|-----------|
| <b>CAS number</b>   | : 67-63-0 |
| <b>Product code</b> | : 001105  |

| Ingredient name | %   | CAS number |
|-----------------|-----|------------|
| propan-2-ol     | 100 | 67-63-0    |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Inhalation</b>   | : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |
| <b>Skin contact</b> | : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ingestion</b>    | : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention.                   |

## Section 4. First aid measures

immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

#### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

#### Overexposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- otes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Firefighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.



## Section 5. Firefighting measures

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide
- Special protective actions for firefighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for firefighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

## Section 7. Handling and storage

### Advice on general occupational hygiene

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

### Conditions for safe storage, including any incompatibilities

- : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controlsPersonal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| propan-2-ol     | <p><b>ACGIH TLV (United States, 3<del>R</del>012).</b><br/> TWA: 200 ppm 8 hours.<br/> STEL: 400 ppm 15 minutes.</p> <p><b>OSHA PEL 1989 (United States, 3<del>R</del>989).</b><br/> TWA: 400 ppm 8 hours.<br/> TWA: 980 mg/m<sup>3</sup> 8 hours.<br/> STEL: 500 ppm 15 minutes.<br/> STEL: 1225 mg/m<sup>3</sup> 15 minutes.</p> <p><b>- IOSH / EL (United States, 1<del>R</del>013).</b><br/> TWA: 400 ppm 10 hours.<br/> TWA: 980 mg/m<sup>3</sup> 10 hours.<br/> STEL: 500 ppm 15 minutes.<br/> STEL: 1225 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL (United States, 6<del>R</del>010).</b><br/> TWA: 400 ppm 8 hours.<br/> TWA: 980 mg/m<sup>3</sup> 8 hours.</p> |

### Appropriate engineering controls

- : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

### Environmental exposure controls

- : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

#### Hygiene measures

- : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

## Section 8. Exposure controlsPersonal protection

- Eye/Face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- / Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid. [COLORLESS LIQUID WITH THE ODOR OF RUBBING ALCOHOL]
- Color** : Colorless.
- Molecular weight** : 60.11 g/mole
- Molecular formula** : C<sub>3</sub>H<sub>8</sub>O
- Boiling/Condensation point** : 83°C (181.4°F)
- Melting/Freezing point** : -90°C (-130°F)
- Critical temperature** : Not available.
- Odor** : Alcohol-like.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Closed cup: 11.7°C (53.1°F)
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : 1.7 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 2%  
Upper: 12%
- Vapor pressure** : 4.4 kPa (33.002681467 mm Hg) [room temperature]
- Vapor density** : 2.1 (Air = 1)
- Specific Volume (ft<sup>3</sup>/lb)** : 1.2739
- Gas Density (lb/ft<sup>3</sup>)** : 0.785
- / Relative density** : 0.79

## Section 9. Physical and chemical properties

|                                                |                   |
|------------------------------------------------|-------------------|
| <b>Solubility</b>                              | : Not available.  |
| <b>Solubility in water</b>                     | : Not available.  |
| <b>Partition coefficient: nM octanol/water</b> | : 0.05            |
| <b>Autoignition temperature</b>                | : 456°C (852.8°F) |
| <b>Decomposition temperature</b>               | : Not available.  |
| <b>SADT</b>                                    | : Not available.  |
| <b>Viscosity</b>                               | : Not available.  |

## Section 10. Stability and reactivity

**Reactivity** : No specific test data related to reactivity available for this product or its ingredients.

**Chemical stability** : The product is stable.

**Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.

**Conditions to avoid** : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

**Incompatibility with various substances** : Highly reactive or incompatible with the following materials: acids and moisture.

**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/Ingredient name | Result                                           | Species              | Dose                                   | Exposure          |
|-------------------------|--------------------------------------------------|----------------------|----------------------------------------|-------------------|
| propan-2-ol             | LC50 Inhalation Gas.<br>LD50 Dermal<br>LD50 Oral | Rat<br>Rabbit<br>Rat | 45248 ppm<br>12800 mg/kg<br>5000 mg/kg | 1 hours<br>-<br>- |

#### Irritation/Corrosion

| Product/Ingredient name | Result                   | Species | Score | Exposure                | Observation |
|-------------------------|--------------------------|---------|-------|-------------------------|-------------|
| propan-2-ol             | Eyes - Moderate irritant | Rabbit  | -     | 24 hours 100 milligrams | -           |
|                         | Eyes - Moderate irritant | Rabbit  | -     | 10 milligrams           | -           |
|                         | Eyes - Severe irritant   | Rabbit  | -     | 100 milligrams          | -           |
|                         | Skin - Mild irritant     | Rabbit  | -     | 500 milligrams          | -           |

#### Sensitization

Not available.

## Section 11. Toxicological information

### Nutagenicity

Not available.

### Carcinogenicity

Not available.

### Classification

| Product name | Ingredient name | OSHA | IA/ C | - TP |
|--------------|-----------------|------|-------|------|
|              | propan-2-ol     | -    | 3     | -    |

### / eproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

| - ame       | Category   | / oute of exposure | Target organs    |
|-------------|------------|--------------------|------------------|
| propan-2-ol | Category 3 | Not applicable.    | Narcotic effects |

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

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

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Delayed and immediate effects and also chronic effects from short and long term exposure

Date of issue/Date of revision : 5/20/2015. Date of previous issue : 10/28/2014. Version : 0.02 8/14

## Section 11. Toxicological information

### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

### - Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

| Product/Ingredient name | Result                                             | Species                       | Exposure |
|-------------------------|----------------------------------------------------|-------------------------------|----------|
| propan-2-ol             | Acute LC50 1400000 to 1950000 µg/l<br>Marine water | Crustaceans - Crangon crangon | 48 hours |
|                         | Acute LC50 4200 mg/l Fresh water                   | Fish - Rasbora heteromorpha   | 96 hours |

### Persistence and degradability

Not available.

### Bioaccumulative potential

| Product/Ingredient name | LogP <sub>ow</sub> | BCF | Potential |
|-------------------------|--------------------|-----|-----------|
| propan-2-ol             | 0.05               | -   | low       |

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                                   | DOT                                                                                                                                                                                                                                     | TDG                                                                                                                | Nexico                                                                                 | INDG                                                                                     | IATA                                                                                                                                                                                                            |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>U- number</b>                  | UN1219                                                                                                                                                                                                                                  | UN1219                                                                                                             | UN1219                                                                                 | UN1219                                                                                   | UN1219                                                                                                                                                                                                          |
| <b>U- proper shipping name</b>    | ISOPROPANOL OR ISOPROPYL ALCOHOL                                                                                                                                                                                                        | ISOPROPANOL; OR ISOPROPYL ALCOHOL                                                                                  | ISOPROPANOL OR ISOPROPYL ALCOHOL                                                       | ISOPROPANOL (ISOPROPYL ALCOHOL)                                                          | ISOPROPANOL                                                                                                                                                                                                     |
| <b>Transport hazard class(es)</b> | 3<br>                                                                                                                                                  | 3<br>                             | 3<br> | 3<br> | 3<br>                                                                                                                        |
| <b>Packing group</b>              | II                                                                                                                                                                                                                                      | II                                                                                                                 | II                                                                                     | II                                                                                       | II                                                                                                                                                                                                              |
| <b>Environment</b>                | No.                                                                                                                                                                                                                                     | No.                                                                                                                | No.                                                                                    | No.                                                                                      | No.                                                                                                                                                                                                             |
| <b>Additional information</b>     | <u>Limited quantity</u><br>Yes.<br><br><u>Packaging instruction</u><br><b>Passenger aircraft</b><br>Quantity limitation: 5 L<br><br><b>Cargo aircraft</b><br>Quantity limitation: 60 L<br><br><u>Special provisions</u><br>IB2, T4, TP1 | <u>Explosive Limit and Limited Quantity Index</u><br>1<br><br><u>Passenger Carrying / load or / ail Index</u><br>5 | -                                                                                      | -                                                                                        | <u>Passenger and Cargo Aircraft</u> Quantity limitation: 5 L<br><u>Cargo Aircraft Only</u><br>Quantity limitation: 60 L<br><u>Limited Quantities M</u><br><u>Passenger Aircraft</u><br>Quantity limitation: 1 L |

"/ efer to CF/ 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of NA/ POL 73R8 and the IBC Code** : Not available.

## Section 15. / egulatory information

**U.S. Federal regulations** : TSCA 8(a) CD/ Exempt~~Partial~~ exemption: Not determined  
**United States inventory (TSCA 8b)**: This material is listed or exempted.

**Clean Air Act Section 112** : Not listed  
**(b) Hazardous Air Pollutants (HAPs)**

**Clean Air Act Section 602** : Not listed  
**Class I Substances**

**Clean Air Act Section 602** : Not listed  
**Class II Substances**

**DEA List I Chemicals** : Not listed  
**(Precursor Chemicals)**

**DEA List II Chemicals** : Not listed  
**(Essential Chemicals)**

### SA/ A 302~~304~~

#### Composition~~Information~~ on ingredients

No products were found.

**SA/ A 304 / Q** : Not applicable.

### SA/ A 311~~312~~

**Classification** : Fire hazard  
 Immediate (acute) health hazard

#### Composition~~Information~~ on ingredients

| - ame       | %   | Fire hazard | Sudden release of pressure | / eactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|-------------|-----|-------------|----------------------------|-----------|---------------------------------|---------------------------------|
| propan-2-ol | 100 | Yes.        | No.                        | No.       | Yes.                            | No.                             |

### SA/ A 313

|                                       | Product name      | CAS number | %   |
|---------------------------------------|-------------------|------------|-----|
| <b>Form / M eporting requirements</b> | Isopropyl alcohol | 67-63-0    | 100 |
| <b>Supplier notification</b>          | Isopropyl alcohol | 67-63-0    | 100 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

### State regulations

**Nassachusetts** : This material is listed.

**- ew York** : This material is not listed.

**- ew Jersey** : This material is listed.

**Pennsylvania** : This material is listed.

**Canada inventory** : This material is listed or exempted.

### International regulations



## Section 15. / egulatory information

**International lists**

- Australia inventory (AICS):** This material is listed or exempted.
- China inventory (IECSC):** This material is listed or exempted.
- Japan inventory:** This material is listed or exempted.
- Korea inventory:** This material is listed or exempted.
- Nalaysia Inventory (EHS / egister):** Not determined.
- ew Zealand Inventory of Chemicals (- ZloC):** This material is listed or exempted.
- Philippines inventory (PICCS):** This material is listed or exempted.
- Taiwan inventory (CS- - ):** Not determined.

**Chemical Weapons Convention List Schedule I Chemicals** : Not listed

**Chemical Weapons Convention List Schedule II Chemicals** : Not listed

**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

### Canada

**WHNIS (Canada)**

- : Class B-2: Flammable liquid
- Class D-2B: Material causing other toxic effects (Toxic).
- CEPA Toxic substances:** This material is not listed.
- Canadian A/ ET:** This material is not listed.
- Canadian - P/ I:** This material is listed.
- Alberta Designated Substances:** This material is not listed.
- Ontario Designated Substances:** This material is not listed.
- Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous Nateral Information System (U.S.A.)

|                  |   |   |
|------------------|---|---|
| Health           | * | 2 |
| Flammability     |   | 3 |
| Physical hazards |   | 0 |
|                  |   |   |

Caution: HNIS® ratings are based on a 0M rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HNIS® ratings are not required on SDSs under 29 CF/ 1910. 1200, the preparer may choose to provide them. HNIS® ratings are to be used with a fully implemented HNIS® program. HNIS® is a registered mark of the - ational Paint & Coatings Association (- PCA). HNIS® materials may be purchased exclusively from J. J. Keller (800) 327M868.

The customer is responsible for determining the PPE code for this material.

### - ational Fire Protection Association (U.S.A.)



## Section 16. Other information

/ eprinted with permission from - FPA 704M2001, Identification of the Hazards of N aterials for Emergency  
/ esponse Copyright ©1997, - ational Fire Protection Association, Quincy, NA 02269. This reprinted material is not the complete and official position of the - ational Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, - ational Fire Protection Association, Quincy, NA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in - FPA 49 and - FPA 325, which would be used as a guideline only. Whether the chemicals are classified by - FPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of printing       | : 5/20/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Date of issue          | : 5/20/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Date of revision       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Date of previous issue | : 10/28/2014.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Version                | : 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Key to abbreviations   | : ATE = Acute Toxicity Estimate<br>BCF = Bioconcentration Factor<br>GHS = Globally Harmonized System of Classification and Labelling of Chemicals<br>IATA = International Air Transport Association<br>IBC = Intermediate Bulk Container<br>IMDG = International Maritime Dangerous Goods<br>LogPow = logarithm of the octanol/water partition coefficient<br>MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)<br>UN = United Nations<br>ACGIH – American Conference of Governmental Industrial Hygienists<br>AIHA – American Industrial Hygiene Association<br>CAS – Chemical Abstract Services<br>CEPA – Canadian Environmental Protection Act<br>CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)<br>CFR – United States Code of Federal Regulations<br>CPR – Controlled Products Regulations<br>DSL – Domestic Substances List<br>GWP – Global Warming Potential<br>IARC – International Agency for Research on Cancer<br>ICAO – International Civil Aviation Organisation<br>Inh – Inhalation<br>LC – Lethal concentration<br>LD – Lethal dosage<br>NDSL – Non-Domestic Substances List<br>NIOSH – National Institute for Occupational Safety and Health<br>TDG – Canadian Transportation of Dangerous Goods Act and Regulations<br>TLV – Threshold Limit Value<br>TSCA – Toxic Substances Control Act<br>WEEL – Workplace Environmental Exposure Level<br>WHMIS – Canadian Workplace Hazardous Material Information System |

/ eferences : Not available.

Indicates information that has changed from previously issued version.

- otice to reader

## Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



**APPENDIX - F**  
**PREFERRED HASP – FEBRUARY 2024**

## **Health and Safety Plan**

**for**

**19 Clay Street and 60-62 Commercial Street**

**Brooklyn, New York 11222**

**BCP Site No. Not Assigned**

**Prepared for**

Clay Properties, LLC  
134 North 4<sup>th</sup> Street  
Brooklyn, NY 11249

**Submitted to:**

**New York State Department of Environmental Conservation**



**Prepared by**

Preferred Environmental Services

323 Merrick Avenue, North Merrick, New York 11566

**February 2024**

## TABLE OF CONTENTS

|     |                                              |    |
|-----|----------------------------------------------|----|
| 1.0 | Introduction and Project Description         | 1  |
| 2.0 | Site Organization and Coordination           | 4  |
| 3.0 | Integrated Safety Management System          | 8  |
| 4.0 | Task Specific Hazard Evaluation and Controls | 9  |
| 5.0 | Other Health and Safety Plan Elements        | 15 |
| 6.0 | Training and Medical Requirements            | 25 |

## FIGURE

Figure 1 - Hospital Route

## LIST OF APPENDIXES

|            |                                                                |
|------------|----------------------------------------------------------------|
| Appendix A | Toolbox Safety Meeting Form                                    |
| Appendix B | Material Safety Data Sheets                                    |
| Appendix C | Health and Safety Plan Acceptance and Training Acknowledgement |
| Appendix D | Sample of Report of Accident/Injury Form                       |

## **1.0 Introduction and Project Description**

This Health and Safety Plan (HASP) has been prepared for use during the implementation of the work associated with the Remedial Investigation Work Plan (RIWP) at the 19Clay Street and 60-62 Commercial Street, Brooklyn, New York site. The HASP is intended to be utilized in conjunction with the RIWP and Quality Assurance Project Plan (QAPP). The RIWP presents the site background and defines the field sampling program. This HASP provides a mechanism for establishing safe working conditions at the site.

The RIWP describes investigatory activities to be implemented in coordination with the NYSDEC to further evaluate the contamination at the Subject Property. The Subject Property is currently in the NYSDEC Brownfield Cleanup Program. Environmental sampling activities will be performed by Preferred, as per the RIWP, prepared for this project. Preferred field personnel will work under the direction of the Preferred Project Directors.

This Health and Safety Plan (HASP) addresses the safety aspects of the spectrum of environmental work activities to be conducted at the Subject Property as per the RIWP. Activities potentially fall under the scope of Code of Federal Regulations, 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER). The purpose of this document is to establish overall site-specific health and safety guidelines to be followed by all personnel conducting work at this site regardless of organizational or regulatory affiliation. The levels of protection and procedures specified in this HASP are based on the best information available from historical data and recent evaluations of the Subject Property. Therefore, these recommendations represent the minimum health and safety requirements to be observed by all personnel engaged in work at the Subject Property. Unforeseeable Subject Property conditions, changes in scope of work, or hazardous conditions not previously considered will warrant a reassessment of the protection levels and controls stated.

### **Project Description**

The RIWP prepared by Preferred, summarizes the potential contamination at the Subject Property, as determined from data gathered during previous investigations. In addition, the RIWP describes Investigatory activities to be implemented in coordination with the NYSDEC at the Subject Property. Preferred field personnel will work under the direction of the Preferred Project Directors

Investigatory activities will include:

- Installation and sampling of groundwater monitoring wells, soil borings, soil vapor points and
- the collection of soil, groundwater and air samples

---

#### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

## **FOREWORD**

The Occupational Safety and Health Act (OSHA) implementing regulations of 29 CFR 1910.120 govern hazardous waste operations and emergency response. These regulations require that employers of employees involved in certain specific hazardous waste operations 1) develop and implement a written health and safety PROGRAM for employees involved in hazardous waste operations, and 2) that the program incorporate a site-specific HASP.

Preferred Environmental Services (Preferred) has employees conducting activities which fall within the scope of these regulations, and thus, has in place a written health and safety PROGRAM as required. Its contents are contained in the Preferred HAZWOPER Program Manual. Some activities conducted at the Subject Property may potentially within the scope of these OSHA regulations. Thus, to assure regulatory compliance, this site-specific HASP covering activities to be conducted at portions of the Subject Property have been prepared. The Integrated Safety Management System (ISMS) and Environmental Safety, Health, and Quality check lists will be used to define safe work procedures for work conducted.

## **1.0 INTRODUCTION**

The regulatory requirements for HASPs are found at 29 CFR 1910.120 (b)(4) and include ten specific elements which are outlined in this HASP:

- A) Safety and health risk hazard analysis
- B) Frequency and types of monitoring required
- C) Personal protective equipment requirements
- D) Decontamination procedures
- E) Site control measures
- F) Spill containment program
- G) Emergency response plan
- H) Employee training assignments and requirements
- I) Medical surveillance requirements
- J) Confined space entry procedures - (No confined space entry to be performed).

---

### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156



## 2.0 SITE ORGANIZATION AND COORDINATION

The following section describes the organizational structure for the environmental sampling. Key personnel and their responsibilities are listed below:

| Name                         | Title                      | Company/Organization             | Phone #      | Responsibility/Role       |
|------------------------------|----------------------------|----------------------------------|--------------|---------------------------|
| Victoria Whelan, NYS P.G.    | Senior Associate/Geologist | Preferred Environmental Services | 516 546 1100 | Project Manager/Director  |
| William Schlageter, NYS P.G. | Vice President             | Preferred Environmental Services | 516 546 1100 | Quality Assurance Manager |
| Don Tesoriero                | Project Manager            | Preferred Environmental Services | 516 546 1100 | Field Task Manager        |
| Chris Zweier                 | Project Manager            | Preferred Environmental Services | 516 546 1100 | Site Safety Officer       |

\*Any of the above individuals listed can serve as the Site Supervisor (SS) or Site Safety and Health Officer (SSHO) and will act as the Emergency Response Coordinator (ERC).

### 2.1 SITE SAFETY AND HEALTH OFFICER

The SSHO advises the Site Supervisor on safety and health issues and conducts briefings prior to initiation of remedial action activities. The SSHO assesses the potential for worker exposures to hazardous agents, recommends appropriate hazard controls for protection of task site personnel, and will require personnel to obtain immediate medical attention in the event of a work-related injury or illness. The SSHO ensures any necessary monitoring of potential chemical hazards is performed, reviews the effectiveness of monitoring and personal protective equipment, and recommends upgrades or downgrades in protective safety and health measures. The SSHO ensures that appropriate fall protection measures are available and that needed work permits are obtained. The SSHO notifies the Office of Radiation Protection when radiological support is required. The SSHO has stop work authority and advises emergency response personnel of an emergency. The SSHO authorizes the return to work following resolution of any safety and health hazards or other stop work issues. The SSHO ensures that this HASP is revised and approved if there are changes in site conditions or tasks. The SSHO will be available for consultation when required and will be aware of project-related work occurring on-site.

### 2.2 SITE SUPERVISOR

The Site Supervisor has primary responsibility for directing and managing all site investigation field activities, including coordination with any support organizations. The Site Supervisor ensures that all on-site project personnel meet the required level of training, have reviewed the HASP, and are instructed in safe work practices. The Site Supervisor also ensures that a qualified SSHO is designated, maintains a current copy of the HASP, and documents field changes to the HASP in the project logbook. In addition, the Site Supervisor and staff perform oversight of field activities, maintain awareness of site operations, and ensure that all project personnel adhere to ES&H requirements in order to prevent potential accidents from occurring.

---

#### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

The Site Supervisor is responsible for ensuring that the following five core functions of the Integrated Safety Management System (ISMS) are fulfilled appropriately:

- Define the work, roles and responsibilities. Allocate resources to ensure that research goals are balanced with safe work practices.
- Identify and analyze the hazards using the ESH&Q evaluation, consultation with subject matter experts, material safety data sheet information, Work Smart Standards (WSS), lessons learned by other Principal Investigators (PIs) and staff, and other resources.
- Develop and implement hazard controls tailored to the work being performed.
- Resources include Preferred staff, subject matter experts, the Hazardous Materials Inventory System, project procedures, Training Needs Assessment process, Laboratory Operating Manuals, Laboratory Stewards, and Lessons Learned and Alerts. Examples of actions and tools include optimization of engineering controls and procedural approaches with training, HAZCOM job-specific training, job pre-briefings, compliance-based and project-specific training, ES&H permits (e.g., RWP, Lockout/Tagout process), and protective equipment.

Perform work within controls to ensure the work is done safely:

- Communicate expectations to project staff.
- Ensure that the controls identified in the ESH&Q evaluation and this HASP are carried out.
- Ensure opportunity for procedure modification to respond to unanticipated situations.
- Stop work if imminent danger exists.

Provide feedback and continuous improvement:

- Solicit feedback from project staff regarding ESH&Q issues and act on that input.
- Communicate concerns to and seek help from supervisors and the ESH&Q group.
- Reallocate resources to address issues that arise.
- Ensure safety meetings and site briefings are performed.

## **2.3 PRINCIPAL INVESTIGATORS AND FIELD PROJECT PERSONNEL**

Principal Investigators (PI) and field project personnel involved in on-site operations are responsible for understanding the intent of the principles of Integrated Safety Management and are to be knowledgeable of the processes in place to satisfy the intent of Integrated Safety Management Plan.

### **Define the Scope of Work**

- Understand the expectations they are to meet in their particular work assignment.
- Understand the responsibilities of the Site Supervisor and SSHO.
- Provide documentation of training to the Site Supervisor.
- Identify and Analyze the Hazard.
- Notify the SSHO of any special medical conditions (i.e., allergies, diabetes, etc.).
- Actively participate in identification of hazards prior to beginning work.
- Ensure that potential work hazards have been evaluated by subject matter experts and are accounted for in all work practices.
- Develop and Implement Hazard Controls.
- Seek the help of the SSHO and other subject matter experts, as appropriate, to analyze the hazards.
- Ensure that control strategies are developed and implemented, as appropriate, before work begins.
- Ensure safety measures are incorporated into activities (i.e., through HASP addendums or amendments, work aides, or standard operating procedures).
- Perform Work Within Controls.
- Perform only those tasks that they believe they can do safely.
- Meet the responsibilities and safely perform the tasks that are delegated to them.
- Take all reasonable precautions to prevent injury to themselves and to their fellow employees; be alert to potentially harmful situations.
- Suspend work if unexpected concerns arise and modify plans to address concerns before resuming work.
- Comply with the work plan and HASP as well as postings and rules at the Subject Property.
- Provide Feedback and Continuous Improvement.
- Keep the SSHO and Site Supervisor informed of any issues, problems, or concerns regarding all aspects of their work.

---

### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

- Notify appropriate management personnel or the facility point of contact of any unsafe condition, violation, noncompliance, or an environmental threat discovered in a facility.
- Report to the SSHO any changes in site conditions that may affect safety and health.
- Immediately notify the SSHO of symptoms or signs of exposure potentially related to any chemical, physical, or biological hazards present at the Subject Property and immediately report any accidents, injuries, and/or unsafe conditions to the SSHO.
- If unsafe conditions develop, task site personnel are authorized and expected to stop work and notify the SSHO and Site Supervisor of the unsafe condition.

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

### **3.0 INTEGRATED SAFETY MANAGEMENT SYSTEM**

The Integrated Safety Management System (ISMS) process systematically integrates safety into management and work practices at all levels so work objectives are accomplished while protecting the public, the worker, and the environment. Direct involvement of workers during the development and implementation of safety management systems is essential for success. Therefore, all personnel are expected to incorporate the following basic ISMS core functions during all work activities:

- Defining the scope of work;
- Identifying and analyzing hazards associated with the work;
- Developing and implementing hazard controls;
- Performing work activities within these controls; and
- Providing feedback on the adequacy of the controls to continue improving safety management.

#### 4.0 TASK SPECIFIC HAZARD EVALUATION AND CONTROLS

The purpose of this section is to provide task hazard evaluation to identify and assess potential hazards that personnel might encounter and to prescribe methods of hazard control. This includes information on Personal Protection Equipment (PPE), physical hazards, and other requirements for the implementation of environmental sampling.

As per requirements of Hazard Corrective Actions (OSHA 29 CFR 1926.32 (f)), a tool box safety meeting form (Appendix A) will be used for this project.

Material Safety Data Sheets (MSDS) for chemicals to be potentially brought to the Subject Property for environmental sampling are included also in Appendix B. A description of sampling procedures and the activities to be conducted at the Subject Property during the required environmental sampling work is described below.

#### 4.1 INSTALLATION OF SOIL BORINGS AND FIELD SAMPLING

**Task Description:** Procedures for the installation of soil borings and field sampling are described in the RIWP. Soil samples will be retrieved by a Geoprobe during installation of soil borings. The air monitoring action levels using Photo-Ionization Detector (PID) cited in this section will be used to safeguard workers and observers during the implementation of the field investigation program.

Samples will be handled and transported according to regulatory requirements and procedures outlined in the RIWP. Samples will be preserved and stored as required by the analytical protocols (e.g., cooled, preservative added). Storage on-site may occur for short periods of time, packed on-ice but will be quickly transferred to refrigerator storage in the fixed base laboratory at the appropriate temperatures. All storage of contaminated samples will follow procedures and relevant regulations.

**Equipment Utilized:** Equipment utilized during remediation/investigation activities may include, an excavation, Geoprobe drill rig, hand augers, shovels, etc.

#### Task Hazards and Controls:

- *Chemical and Radiological Hazards*

Soil Contact: As soil samples will be handled briefly by workers in appropriate PPE, the risk of chemical exposure from short-term exposure to soil or other environmental media samples is minimal. However, direct contact with contaminated materials will be avoided, therefore, disposable latex or nitrile gloves and safety glasses will be worn when conducting soil and sediment sampling to prevent eye and skin contact.

---

#### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

- *Physical Hazards*

Direct contact with equipment: Precautions will be made to keep a minimum of ten (10) feet from the maximum reach of the excavator and/or drill rig during operation. Furthermore, all on-ground personnel will wear hard hats, work gloves, construction boots and safety glasses as necessary.

Tripping/Falling: Precautions should be taken to avoid trip, slip, and fall accidents when climbing irregular or slippery surfaces. Before changing location visually survey the area for slippery surfaces and tripping hazards.

Heat/Cold Stress: Wear clothing appropriate for environmental and weather conditions. Temperature extremes may be a hazard for consideration depending on the timing of the activity. Refer to Section 5.5 for discussion of recognition of symptoms and controls.

- *Biological/Vector Hazards:*

Ticks/Snakes/Rodent/Pathogens: Be cautious of snakes, and vector carriers such as ticks. Check clothing and skin for ticks after walking in brush. Wash hands before eating and drinking.

- **Personal Protective Equipment Required to Address General Site Hazards (OSHA 29 CFR 1926.26)**

Level of Protection: D - Minimum PPE required to be worn by all staff on this project, with proper clothing requirements (no shorts, proper shoes, shirt) will be enforced, especially during summer:

- Protective Clothing: Preferred-issued work clothes or disposable tyvek
- Hard Hat that meet ANSI Standard Z89.1;
- Safety Vest - Class II
- Safety glasses meeting ANSI Standard Z87 will be worn.
- Gloves: Latex or nitrile (when conducting groundwater sampling or handling corrosive or oxidizing reagents)
- Footwear: Steel toe or comparable work boots meeting ANSI Standard Z41 will be worn.

Potable water will be provided, and consumption encouraged via toolbox talk about heat stroke exposures.

Level C protection may consist of the following:

- Work clothes
- Steel toe or comparable work boots meeting ANSI Standard Z41 will be worn.
- Work Gloves
- Hard hat that meet ANSI Standard Z89.1;
- Safety Vest

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

- Safety glasses meeting ANSI Standard Z87 will be worn
- Chemical Resistant Outer Gloves
- Chemical Resistant Inner Surgical Gloves
- Hearing protection
- Chemical Resistant Coveralls
- Full-Face or Half-Face Piece APR (NIOSH) with combination cartridges

### **Air Monitoring Requirements**

Air Quality: Air monitoring with an organic vapor analyzer or other suitable instrument will be performed during all soil sampling activities. A volatile organic compound (VOC) ambient air monitoring result of 3.0 parts per million (ppm) will trigger a warning response. If a detection of 5.0 ppm VOC in ambient air is detected, the SSO will suspend work and instruct the workers to move to a safe zone until such time the work zone is tested safe.

No additional monitoring is proposed at this time.

- **Noise (OSHA 29 CFR 1926.52)**

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Workers who will perform or be proximate to high noise tasks (such as drilling) and operations for short durations (less than 1-hour) would be provided with hearing protection devices. If deemed necessary, the SSO will be consulted on the need for additional hearing protection and the need to monitor sound levels for site activities.

- **Hand and Power Tools**

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel at all times when utilizing hand and power tools and GFI-equipped circuits will be used for all power tools. Tool inspections will be conducted prior to each work shift by labor force that will use the tool. Damaged tools will be tagged out of service and repaired. In order to protect against electrocution:

- Equipment will be equipped with GFCI;
- All electrical work will be conducted by a licensed electrician;
- All equipment will stay a minimum of ten (10) feet from overhead energized electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV.

- **Slips, Trips, and Falls, and Fall Protection**

---

### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156



Working in and around the Subject Property will pose slip, trip and fall hazards due to slippery surfaces that may be wet from rain or ice. Soil boring and groundwater monitoring well installation may cause uneven footing in the trenches and around the spoil piles. Daily housekeeping inspections of the work areas will be conducted to identify, eliminate, and control slip trip and fall hazards. Preferred requires 100 percent tie-off for working heights in excess of above six (6) feet of a working surface; however, no such elevated work is anticipated. Preferred will take precautions to comply with fall protection in accordance with OSHA 29 CFR 1926.

- **Manual Lifting**

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. Site workers will be instructed to use power equipment to lift heavy loads whenever possible and to evaluate loads before trying to lift them (i.e. they should be able to easily tip the load and then return it to its original position). Carrying heavy loads with a buddy and proper lifting techniques:

- 1) Make sure footing is solid.
- 2) Make back straight with no curving or slouching.
- 3) Center body over feet.
- 4) Grasp the object firmly and as close to your body as possible.
- 5) Lift with legs.
- 6) Turn with your feet, to avoid stress in the lower back. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods. In addition, hand digging for pipes may present lifting/ergonomic hazards.

- **Confined Space Entry (29 CFR 1926 Subpart AA)**

No Confined Space Entry concerns were identified for the RIWP activities.

- **Severe Weather**

Outdoor operations will cease in the event of severe weather conditions as decided by the SSO. Severe weather may include but not limited to heavy rains, high winds, snow and ice. All heavy equipment use will cease prior to the onset of a thunderstorm regardless of the stage of activity. Work continuation after other severe weather will be determined by SSO and/or competent person overseeing operation.

- **Maintenance and Protection of Traffic Plan**

- Spotters will be used when backing up trucks and heavy equipment and when moving equipment.

- **Overhead Hazards:**

- Personnel will be required to wear hard hats that meet ANSI Standard Z89.1;
- All ground personnel will stay clear of suspended loads;

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

- All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and
- All overhead hazards will be identified prior to commencing work operations.
- **Fire/Explosion:**
  - ABC type fire extinguishers will be readily available; and
  - No smoking in work area.
- **Pinch/Cut/Smash:**
  - Cut resistant Kevlar work gloves will be worn when dealing with sharp objects;
  - All hand and power tools will be maintained in safe condition; and
  - Guards will be kept in place while using hand and power tools.

#### **4.2 AIR MONITORING**

Therefore, Preferred will implement a air monitoring plan during the conduct of the soil sampling activities. The air monitoring will be implemented during the installation of soil borings and during soil sampling activities to be completed as part of the SC activities. The purpose of the air monitoring is to provide a measure of protection for the area immediately adjacent to the work zone, from potential airborne contaminant releases as a result of SC activities performed at the Site.

Particulate monitoring will be conducted during ground intrusive activities at the Site. Dust and particulate monitoring will be conducted near the approximate downwind perimeter of the work/exclusion zone, when possible, or where dust generating operations are apparent.

Particulate air monitoring will be conducted with a DustTrak (or a similar device). This instrument is equipped with an audible alarm (indication of exceedance) and is capable of measuring particulate matter less than 10 micrometers in size (PM-10). It will continually record emissions (calculating 15-minute running average concentrations) generated during field activities. The dust monitoring devices will be checked and recorded periodically throughout the day of intrusive activities to assess emissions and the need for corrective action.

Particulate monitoring response and action levels include:

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

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

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

**Volatile Organic Compound Air Monitoring.** Volatile organic compound (VOC) air monitoring will be conducted in conjunction with the dust monitoring program. VOC air monitoring will be conducted using a RAE Systems MiniRAE 3000 VOC instrument (or a similar photoionization detector device) to provide real-time recordable air monitoring data. VOC monitoring will be conducted for ground intrusive (continuous monitoring). VOCs will be monitored and recorded at the downwind perimeter of the immediate work area. Upwind concentrations will be measured before field activities commence and periodically throughout the day to establish background conditions. The downwind VOC monitoring device will also be checked periodically throughout the day to assess emissions and the need for corrective action.

VOC monitoring response and action levels include:

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If the organic vapor level remains sustained above 5 ppm at the perimeter of the work area, activities must be shutdown and work will be re-evaluated.

#### Documentation and Calibration

The volatile organic compound air monitoring device shall be calibrated prior to daily field activities according to manufacturer's instructions and standard industrial hygiene practices. In addition, monitoring instruments will be checked for "drift" upon completion of daily field activities. Calibration measurements will be recorded on a field data record. Field measurements will be recorded and available for State (NYSDEC and NYSDOH) personnel to review. The particulate monitoring device is factory calibrated on an annual basis.

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

## **5.0 OTHER HEALTH AND SAFETY PLAN ELEMENTS**

### **5.1 Revisions / Modifications to the HASP**

The following actions will warrant revision and approval of this plan by the appropriate health and safety disciplines:

- Change in tasks (or previously unidentified tasks) that could impact employee health and safety.
- Changes in hazards (unknown or not previously addressed) which require a significant change in, or addition to, respiratory protection (as defined in exemptions to the plan modifications), physical/barrier protection features, or other engineering controls.

#### **5.1.1 Modifications allowed**

The SSHO may upgrade PPE as necessary. These changes must be documented in the field logbook. The change and reason or evidence for the change must also be documented in the field logbook. For upgrades to include respiratory protection (including air-purifying and supplied air) for previously unidentified non-radiological issues or contaminants such as VOCs, the appropriate health and safety disciplines must be contacted. The SSHO will approve and document changes in PPE in the field logbook. Upgrades to include respiratory protection will require the SSHO to ensure workers have 40-Hour HAZWOPER Training and to assess any additional medical surveillance requirements.

## **5.2 MONITORING**

Historical site data indicate that chemical exposure of site personnel will not be a significant concern within the scope of this project, as direct exposure will be limited. Due to the documented findings of the historical site data, exposure to contaminants is possible; therefore, monitoring will be required for all field activities. Site monitoring requirements may change based on site conditions. All changes must be documented in the site logbook.

## **5.3 SITE AND SPILL CONTROL**

Subject Property access is available from public roads and therefore will not be controlled to the general Subject Property. Based on the anticipated levels and for site security reasons, construction fence will be established around the perimeter for the Subject Property. Exclusion zones may be required for drilling operations and other field activities if required to reduce the accidental spread of hazardous substances from contaminated areas to clean areas; and to secure the work zone. The SSHO will determine, as needed, the locations of the support zone, contamination reduction zone, and the exclusion zone. Personnel accessing the zones must meet access requirements as stated in this HASP.

## **5.4 PERSONAL PROTECTIVE EQUIPMENT**

Level D protection is normally used when the potential for personnel contamination is low, due to mitigation direct exposure during sampling. Level D protection has been specified and special requirements have been covered in the hazard control sections of the specific tasks in Section 4.0, above.

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

Unexpected new hazards will require a reassessment of the specified PPE. Minimum PPE required to be worn by all staff on this project, includes the following:

- Protective Clothing: Preferred-issued work clothes or disposable tyvek
- Hard Hat
- Safety Vest - Class II
- Safety glasses
- Gloves: Latex or nitrile (when conducting groundwater sampling or handling corrosive or oxidizing reagents)
- Footwear: Steel toe or comparable work boots

## 5.5 TEMPERATURE EXTREMES AND SITE CHARACTERISTICS

The effect of temperature extremes on personnel is a primary hazard associated with the activities conducted at the site. Symptoms and controls related to temperature extremes are considered in detail in this section.

Field activities conducted during the summer or winter pose a hazard because of temperature extremes. Since the project site is located in a relatively open area, workers will dress appropriately for environmental conditions, wearing clothing that provides reasonable protection against winter cold and summer sun. Although extreme physical exertion will not be likely within the scope of this project, during hot weather workers are encouraged to be aware of their own symptoms of heat stress (headaches, dizziness, increased heart rate), to drink plenty of water, and to take breaks as needed. Heat stress symptoms, remedies, and monitoring are discussed in Section 5.5.1. Cold exposure effects are discussed in Section 5.5.2.

Workers are also encouraged to apply insect repellent and/or sunscreen as needed prior to field activities. Workers should exercise caution by visually inspecting their immediate area of activity for presence of poisonous/harmful plant, insect, and animal species as well as any hazard resulting from previous human activity.

### 5.5.1 Effects and Prevention of Heat Stress

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur. They can range from mild symptoms such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement, to death.

Heat-related health concerns can include the following:

- **Heat rash:** Caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat and is a nuisance.
- **Heat cramps:** Caused by profuse perspiration combined with inadequate fluid intake and chemical replacement, particularly salts. Signs include muscle spasm and pain in the extremities and abdomen.

- **Heat exhaustion:** Caused by increased stress on various organs to meet increased demands to cool the body. Signs include shortness of breath; increased pulse rate (120-200 beats per minute); pale, cool, moist skin; profuse sweating; dizziness; and lassitude.
- **Heat stroke:** Is the most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. Signs include red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and possibly coma. Medical help must be obtained immediately.

Medical attention must be obtained for the more serious symptoms of heat stress. One or more of the following methods are recommended to help reduce the potential for heat stress:

1. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost due to sweating, use a 0.1 percent saltwater solution, more heavily salted foods, or commercial mixes. The commercial mixes may be preferable for those employees on a low-sodium diet.
2. Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency.
3. Wear long cotton underwear, which acts as a wick to help absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
4. Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.
5. In extremely hot weather, conduct non-emergency response operations in the early morning or evening.
6. Ensure that adequate shelter is available to protect personnel against sun, heat, or other adverse weather conditions that decrease physical efficiency and increase the probability of accidents.
7. In hot weather, rotate workers wearing protective clothing.
8. Maintain good hygiene frequently changing clothing and showering daily. Clothing should be permitted to dry during rest periods. Workers who notice skin problems should immediately consult medical personnel.

### 5.5.2 Cold Exposure

Persons working outdoors in temperatures at or below freezing may suffer from cold exposure. During prolonged outdoor periods with inadequate clothing for protection, the effects of cold exposure may occur even at temperatures well above freezing. Cold exposure may cause severe injury due to freezing of exposed body surfaces (frostbite), or profound generalized cooling (hypothermia), possibly resulting in death. Areas of the body which have high surface area-to-volume ratios such as fingers, toes, and ears are the most susceptible to frostbite.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- **Frost nip or incident frostbite:** characterized by sudden blanching or whitening of skin.
- **Superficial frostbite:** skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

- **Deep frostbite:** tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia, or lowering of the core body temperature, is caused by exposure to freezing or rapidly dropping temperatures. Symptoms are usually exhibited in five stages: 1) shivering and loss of coordination; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F (35°C); 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing the extremities; and 5) death.

## **5.6 DECONTAMINATION**

Preferred and its subcontractors will maintain on-site decontamination equipment such as potable water, alconox, isopropyl alcohol, and water reservoir tank. Groundwater, soil and soil vapor sampling, and drilling equipment will be decontaminated between each boring, well installation, sampling event, and prior to mobilization on- or off-site.

Decontamination of personnel will be conducted only in the unexpected event that contamination is detected. At a minimum, personnel who have conducted work at the Subject Property will wash their hands prior to eating or drinking. Preferred personnel will supervise, assist, and document incidents involving personnel contamination.

## **5.7 EMERGENCY PREPAREDNESS/RESPONSE**

The first worker who notices that a medical emergency or personal injury has occurred will immediately make a subjective decision as to whether the emergency is life threatening and/or otherwise serious.

### Life-Threatening and/or Otherwise Serious Incident

If a life-threatening incident occurs, those persons recognizing the situation should do whatever actions in their capabilities to reduce the threat and then the SSHO will be contacted. The SSHO will immediately notify the local emergency agencies and implement emergency action procedures to have someone meet and guide EMS to the incident location.

The SSHO will be kept apprised of the situation and the location of the victim(s). As the SSHO proceeds to the accident scene, communications channels will be opened and kept on standby until the SSHO has surveyed the scene and performed a primary survey of the victim. The SSHO will provide emergency action guidance consistent with the injury and will relay the appropriate information to the site person meeting the emergency response team.

Depending on the nature of the injury and the location at which the injury occurred, the SSHO will determine whether the person can be moved or whether the EMS team will need to come into the work area to assist the victim. Should the victim be injured in the work zone, all appropriate life-saving methods will be exercised in that area before attempting decontamination (if required) of the victim. The extent of emergency decontamination performed will depend on the severity of the injury or illness and the nature of the contamination. If the emergency is such that emergency decontamination cannot be performed

---

### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

safely, the victim will be given necessary first-aid treatment and wrapped in a blanket prior to transportation by the emergency response team..

If heat stress is a factor in a victim's injury/illness, all protective clothing will be removed from the victim immediately.

#### Non-Life-Threatening Incident

Should it be determined that no threat to life is present, a co-worker will assist the injured person and contact the SSHO as soon as reasonably possible. The SSHO will notify the Contractor of the incident. For all non-life threatening injuries, all medical assistance will be provided outside the work zone to reduce the spread of contamination to medical personnel or equipment.

All emergency services can be reached by dialing 911 from any facility or mobile telephone. Access to phones and/or radios will be provided to onsite personnel. The Emergency Response Coordinator (ERC) will coordinate all emergency response operations. Should evacuation from the site become necessary, the evacuation route to the hospital is shown in Figure 1. Emergency telephone numbers are given below.

#### **Emergency Response Coordinator**

##### **Preferred Environmental Services - Key Personnel & In-Office Project Directors**

Mr. William Schlageter 516-546-1100, cell 917-715-0752 - bschlageter@preferredenv.com

Ms. Victoria Whelan 516-546-1100, cell 631-793-8821 – vwhelan@preferredenv.com

#### **Field Staff and SSHO**

Chris Zweier cell: 516 729-3293

---

#### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156



## **EMERGENCY TELEPHONE NUMBERS**

**Police** - 911

**Fire Dept:**

New York City Fire Department, Engine Company 319  
78-11 67<sup>th</sup> Rd., Queens, NY

### **Other Emergency Contact information:**

Consolidated Edison: Gas/Electric Emergency 1-800-752-6633  
Water/Sewer: NYCDEP- 311  
NY Poison Control: 800-222-1222

## **5.8 ACCESS AND EGRESS**

All entrances and exits at this project site will be kept free of ice and snow to prevent worker injuries from slips, trips and falls or vehicle accidents. Aisles, stairways and walkways, and access to safety, firefighting equipment and first aid equipment will be kept clear of obstructions (e.g., equipment deliveries, office supplies) and/or tripping hazards. All fire lanes, access roads and evacuation routes will be kept clear of equipment, materials and parked vehicles at all times.

A list of potential unsafe situations will also be avoided to make any on-site workplace safer:

- Blocked or cluttered exit passageways (e.g., halls, stairwells);
- Extra or unnecessary boxes, paper or other flammable/combustible products;
- Improper storage of office equipment and supplies;
- Overloaded outlets;
- File and desk drawers in poor condition and left opened; and
- Sharp/bladed equipment (e.g., scissors, cutting knives) improperly stored and poorly maintained.

---

### ***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

## 5.9 MATERIAL HANDLING, STORAGE, USE AND DISPOSAL

Use of Drums and Containers - OSHA defines “anything that holds hazardous chemicals except pipes and piping systems” as a container. Although OSHA does not concern itself with nonhazardous materials; this does not mean that drums or containers containing nonhazardous materials cannot cause injury to workers. Prior to moving drums or containers storing hazardous materials or that otherwise pose a threat to the safety of employees, all employees must be informed of the potential hazards associated with the contents of the drums or containers.

Additional activities requiring appropriate training of employees may include:

- Sampling procedures
- Communication methods
- Methods for relieving pressure from drums and containers or for shielding when pressure cannot be relieved from a remote location
- Emergency response to accidents onsite
- Characterization of wastes to be bulked
- Use of monitoring equipment

**Labeling Drums and Containers** - Drums and containers will be identified and classified prior to packaging for shipment.

**Procedures for Handling Drums and Containers** - Where containers with capacities greater than 5 gallons are used for chemical products or waste materials, the containers are to be handled according to the following procedures:

- When not in use, cover drums/containers with tightfitting lids or bung caps.
- At the conclusion of each work shift, place all drums/ containers in a designated storage area. This area will not properly marked and secured.
- Use mechanical or powered drum handling equipment to move “filled” drums/ containers.
- Manual handling of the drums leads to muscular skeletal injuries and will be avoided to the maximum extent possible.

**Drum Staging** - The following practices should be followed when staging drums to eliminate or reduce unnecessary drum movement:

- Stage drums in rows, two drums wide, with adequate walking space between rows.
- Face drum labels out, toward the aisle so they can be easily read without moving a drum.
- Face the bolt on drums with lid rings out, toward the aisle.
- Do not stack drums on top of one another.
- Stage drums on pallets prior to filling, if possible.

**Opening Drums and Containers** - Only a couple of pounds of built-up pressure can cause a loosened fitting to fly into the air. This can cause injury to site workers and can puncture adjacent containers or drums, causing rupture and leakage. If the drum or container is filled to or near the level of the opening, material can fly from the opening causing injury to site personnel, formation of hazardous/flammable

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

atmospheres at the project site and/or environmental damage. The procedure for opening drums and containers must incorporate the minimum safeguards listed below:

- Employees not directly involved in opening the drum or container must stay a safe distance from the drum or container during the process.
- If the potential for a flammable atmosphere exists or may develop onsite, all equipment and tools must be of a type to prevent sources of ignition (non-sparking, explosion proof, intrinsically safe) and grounding/ bonding of containers must be considered.
- If the pressure within a drum or container cannot be relieved from a remote location, the employee opening the drum or container must be protected by an appropriate shield to reduce the risk of injury.
- Drums and containers are not stepladders. Employees are not allowed to stand on or work off of drums or containers.
- Material handling equipment used to move drums and containers must be selected, positioned and operated in a manner that minimizes the potential for the equipment to act as a source of ignition if a drum or container should rupture.
- When a drum or container exhibits signs of over-pressurization such as swelling or bulging, the drum or container will not be moved until the cause of the over-pressurization has been determined and proper containment procedures have been implemented.
- The number of areas where drums and containers are staged should be limited in order to identify and classify them.
- Areas where drums and containers are staged must be provided with adequate routes for access and egress from the staging area.

**Use of Approved Drums or Containers** - Drums and containers are required to meet the appropriate DOT, OSHA and USEPA regulations and/or Canadian requirements for the materials they contain. Large containers or drums will carry either a DOT approval, or a nationally recognized testing laboratory approval or both. The use of approved drums and containers provides some assurance that the drum or container will not fail due to incompatibility with the stored material and that the drum or container is structurally suitable for designated duty.

**Drum Condition** - The following requirements apply to assessment of the drum condition:

When practical, inspect drums and containers and verify their integrity prior to being moved. Drums and containers that cannot be inspected prior to being moved due to storage conditions (e.g., buried, in a pile, stacked several tiers high) must be moved to an accessible location and inspected prior to further handling.

- Empty drums and containers that cannot be moved without risk of rupture, leakage or spillage into a sound container using a device classified (i.e., intrinsically safe or explosion proof for the class of flammable material) for use around the material being transferred.
- Open drums and containers in a manner that safely relieves excess internal pressure.
- If crystalline material is noted on any container, handle the contents of the container as a shock sensitive waste until positive identification of the contents is determined.

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

**Other Considerations** - Unlabeled drums and containers must be considered to contain hazardous substances and will be handled accordingly until positive content identification has been made. Polyethylene drums and containers are not equipped with a means for electrical grounding. When transferring flammable materials, the polyethylene container (or any other container for that matter) must be equipped with a mechanism that allows for grounding. A grounded suction pump (approved only) or a grounded metallic self-closing faucet can be used to accomplish safe transfer of flammable materials from these containers.

If leaking drums or containers may be present, or ruptures or spills may occur, DOT-specified salvage drums or containers must be available onsite along with suitable quantities of an appropriate absorbent material. Move drums and barrels with a barrel truck or forklift whenever possible. However, if they must be moved manually, follow these safety precautions:

- Before attempting to move a drum or barrel, identify the load or its contents. Read the label on the drum and look for symbols, words or other marks that indicate if contents are hazardous, corrosive, toxic or flammable.
- Check for leaks in the drum or barrel. If leaks are detected, ensure that you have the correct materials to clean up the chemical. Make sure you have been trained in the hazards of the chemical and review the appropriate MSDS if required.
- Roll the drums or barrels by pushing on the center rolling rings. Do not grasp the ends because this places your hands in a position to be pinched between the barrel and another object. Never kick barrels with your feet.

#### **5.10 SIGNS, SIGNALS AND BARRICADES**

Properly located and clearly understood safety signs provide a reminder to facility/location personnel to take proper action or precautions. The placement of such signs is dependent upon the following:

- Required by law governing the work at the property, resulting in mandatory posting
- Where facility/location personnel believe that the posting of such signs may assist in the prevention of accidents and injuries.

**Sign Selection** - In addition to specifically worded signs to serve a particular purpose, there are generally four types of signs:

- **Danger Sign/Tags**—to be used only where an immediate hazard exists or to tag out defective equipment or equipment in need of repair. Signs and tags should have white background and the word “Danger” will appear in white letters on a red oval inside a black rectangular panel.
- **Caution Sign/Tags**—warn against potential hazards or to caution against unsafe practices. Sign and tag wording will be in black letters on a yellow background. The word “Caution” will appear in yellow letters on a black rectangular panel.
- **Warning Sign/Tags**—indicate a potentially hazardous situation, capable of resulting in severe, but not irreversible injury.

---

***Preferred Environmental Services***

323 Merrick Avenue, North Merrick, New York 11566  
Tel (516) 546-1100 Fax (516) 213-8156

- Notice or Instructional Signs/Tags—convey information not necessarily of a safety nature, but often aimed at avoiding confusion and misunderstanding. Signs and tags can be of various colors, but not red or yellow.

**Sign Wording** - General requirements for sign wording are summarized below:

- Concise and easy to read
- Contain sufficient information to be easily understood
- Make a positive, rather than negative message and be accurate in fact
- Be presented in English, unless facility/location personnel determine that an additional language is necessary

**Sign Placement** - requirements for sign placement are presented below:

- Place signs properly so that the intended message is received by facility/location personnel and visitors.
- Securely affix signs to prevent accidental displacement by weather and normal wear and tear.
- Promptly replace illegible or damaged signs.

**Training** - Training will be provided to aid personnel in understanding signs posted at project sites, as summarized below:

- Personnel will be trained to understand signs posted in their workplace.
- Such training is not difficult or time consuming and will be documented. Often such training is accomplished via a safety meeting or as a part of new employee orientation.

**Temporary Signage and Barricades** - Warning signs and barricades will be used at all project sites to clearly identify hazards. Use signage to identify hazards (e.g., open holes trenches).

## **5.11 EXCAVATION**

No excavation is proposed as part of the RIWP activities.

## **6.0 TRAINING/MEDICAL REQUIREMENTS**

### **6.1 SITE-SPECIFIC HAZARD COMMUNICATION AND ACCESS BRIEFING**

Since different training requirements may be needed based on the nature of different tasks to be performed, specific training requirements may be identified. However, generally applicable training requirements are presented here. Visitors not entering any exclusion zone or contamination reduction zone who have very limited potential for exposure to contaminants require:

1. Site-specific hazard communication and access briefing.

All project personnel performing hands-on work that could potentially expose them to hazardous substances, safety, or health hazards will meet the following training requirements:

2. General Employee Training (GET)
  - 40 hour HAZWOPER (SARA/OSHA) training, or equivalent (Note: for certain types of low risk work, 8 or 24 hour training is acceptable)
  - Current HAZWOPER 8-hour Annual Refresher (as applicable)
  - Site-specific hazard communication and access briefing

In addition, the Site Safety and Health Officer requires:

- 8-hour HAZWOPER Supervisor training

Personnel involved in service or maintenance work on energized equipment require:

- Lockout/Tagout training

Prior to beginning work at the project site, all personnel will review this Health and Safety Plan and sign the training acknowledgment form (Appendix C). The site-specific hazard communication and access briefing is documented in the project logbook. If site conditions change, or other hazards are detected, the training and access requirements will be revised accordingly. In the event of a medical emergency, an Accident/Injury Report (Appendix D) is to be completed.

## **6.2 MEDICAL SURVEILLANCE**

A medical surveillance program will be conducted in accordance with the requirements of 29 CFR 1910.120 for:

- All employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year.
- All employees who wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134.
- All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.
- Members of HAZMAT teams.

All Preferred employees receive periodic medical examinations. Because of the low potential for exposure to hazardous agents, it is not expected that additional medical surveillance will be required for any personnel undertaking this project. If necessary, non-Preferred personnel will be required to acknowledge coverage by a medical surveillance program sufficient to satisfy the requirements of 29 CFR 1910.120.

## FIGURES





29 Clay St

Brooklyn, NY 11222

⚠

This route has tolls.

Take Clay St to McGuinness Blvd

- 3 min (0.6 mi)

↑ 1. Head east on Clay St toward Manhattan Ave

0.3 mi

↘ 2. Turn right onto Paidge Ave

312 ft

↘ 3. Turn right onto Provost St

0.1 mi

↘ 4. Turn right onto Freeman St

0.1 mi

Take Pulaski Bridge, Queens Midtown Tunnel and 2nd Ave to 1st Ave. in Manhattan

- 10 min (3.1 mi)

↘ 5. Turn right onto McGuinness Blvd

43 ft

↶ 6. Keep left to continue on Pulaski Bridge

0.6 mi

↗ 7. Slight right toward 49th Ave

95 ft

- 8. Turn right onto 49th Ave  
203 ft
- 9. Turn right onto 11th Pl  
259 ft
- 10. Turn right onto 50th Ave  
85 ft
- ⬆ 11. Turn left onto the I-495 W ramp  
⚠ Toll road  
194 ft
- ↶ 12. Keep left, follow signs for Interstate 495 W and merge onto I-495 W  
⚠ Toll road  
0.1 mi
- ⬆ 13. Continue onto Queens Midtown Tunnel  
⚠ Toll road  
1.2 mi
- ⬆ 14. Continue onto I-495 W/Queens Midtown Tunnel  
⚠ Toll road  
338 ft
- ↶ 15. Use the left lane to take the 35 St exit toward Downtown/34 St/2 Ave  
⚠ Toll road  
0.2 mi
- ↶ 16. Use the left 2 lanes to turn left onto E 35th St  
440 ft
- 17. Turn right at the 1st cross street onto 2nd Ave  
0.4 mi
- ↶ 18. Turn left onto E 26th St  
0.1 mi
- ↶ 19. Turn left onto 1st Ave.  
384 ft

NYC Health + Hospitals / Bellevue.

462 1st Ave., New York, NY 10016

# **Appendix A**

## **Tool Box Form**

# TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

|               |       |                 |                   |                          |  |
|---------------|-------|-----------------|-------------------|--------------------------|--|
| Project Name: |       |                 | Project Location: |                          |  |
| Date:         | Time: | Conducted by:   |                   | Signature/Title:         |  |
| Client:       |       | Client Contact: |                   | Subcontractor companies: |  |

## TRACKing the Tailgate Meeting

Think through the Tasks (list the tasks for the day):

|         |         |         |
|---------|---------|---------|
| 1 _____ | 3 _____ | 5 _____ |
| 2 _____ | 4 _____ | 6 _____ |

|                                                                                                                                                                |                          |                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------|
| <b>Other Hazardous Activities</b> - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations | <input type="checkbox"/> | If there are none, write "None" here: _____ |
| If yes, describe them here: _____                                                                                                                              |                          |                                             |
| How will they be controlled? _____                                                                                                                             |                          |                                             |

|                                                                                                                                                         |             |                                                      |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------|-------|
| <b>Pework Authorization</b> - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins: |             | Doc #                                                | Doc # |
| <input type="checkbox"/> Not applicable                                                                                                                 | Doc # _____ | <input type="checkbox"/> Working at Height           | _____ |
| <input type="checkbox"/> Energy Isolation (LOTO)                                                                                                        | _____       | <input type="checkbox"/> Excavation/Trenching        | _____ |
| <input type="checkbox"/> Mechanical Lifting Ops                                                                                                         | _____       | <input type="checkbox"/> Overhead & Buried Utilities | _____ |
|                                                                                                                                                         |             | <input type="checkbox"/> Confined Space              | _____ |
|                                                                                                                                                         |             | <input type="checkbox"/> Hot Work                    | _____ |
|                                                                                                                                                         |             | <input type="checkbox"/> Other permit                | _____ |

|                                                                                                            |                                                                  |                                                                 |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Discuss following questions</b> (for some review previous day's post activities). <b>Check if yes :</b> |                                                                  | <input type="checkbox"/> Topics from Corp H&S to cover?         |
| <input type="checkbox"/> Incidents from day before to review?                                              | <input type="checkbox"/> Lessons learned from the day before?    | <input type="checkbox"/> Any Stop Work Interventions yesterday? |
| <input type="checkbox"/> Any corrective actions from yesterday?                                            | <input type="checkbox"/> Will any work deviate from plan?        | <input type="checkbox"/> If deviations, notify PM & client      |
| <input type="checkbox"/> JLAS or procedures are available?                                                 | <input type="checkbox"/> Field teams to "dirty" JLAS, as needed? | <input type="checkbox"/> All equipment checked & OK?            |
| <input type="checkbox"/> Staff has appropriate PPE?                                                        | <input type="checkbox"/> Staff knows Emergency Plan (EAP)?       | <input type="checkbox"/> Staff knows gathering points?          |
| Comments: _____                                                                                            |                                                                  |                                                                 |

**Recognize** the hazards (check all those that are discussed) (Examples are provided) and **Assess** the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

|                                                                          |                                                                        |                                                                       |
|--------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <input type="checkbox"/> Gravity (i.e., ladder, scaffold, trips) (L M H) | <input type="checkbox"/> Motion (i.e., traffic, moving water) (L M H)  | <input type="checkbox"/> Mechanical (i.e., augers, motors) (L M H)    |
| <input type="checkbox"/> Electrical (i.e., utilities, lightning) (L M H) | <input type="checkbox"/> Pressure (i.e., gas cylinders, wells) (L M H) | <input type="checkbox"/> Environment (i.e., heat, cold, ice) (L M H)  |
| <input type="checkbox"/> Chemical (i.e., fuel, acid, paint) (L M H)      | <input type="checkbox"/> Biological (i.e., ticks, poison ivy) (L M H)  | <input type="checkbox"/> Radiation (i.e., alpha, sun, laser) (L M H)  |
| <input type="checkbox"/> Sound (i.e., machinery, generators) (L M H)     | <input type="checkbox"/> Personal (i.e. alone, night, not fit) (L M H) | <input type="checkbox"/> Driving (i.e. car, ATV, boat, dozer) (L M H) |

## Continue TRACK Process on Page 2

## TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2

**Control** the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.

☒ **STOP WORK AUTHORITY** (Must be addressed in every Tailgate meeting - (See statements below)

|                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Elimination<br><input type="checkbox"/> Engineering controls<br><input type="checkbox"/> General PPE Usage<br><input type="checkbox"/> Personal Hygiene<br><input type="checkbox"/> Emergency Action Plan (EAP)<br><input type="checkbox"/> JLA to be developed/used ( <u>specify</u> )<br><input type="checkbox"/><br><input type="checkbox"/> | <input type="checkbox"/> Substitution<br><input type="checkbox"/> Administrative controls<br><input type="checkbox"/> Hearing Conservation<br><input type="checkbox"/> Exposure Guidelines<br><input type="checkbox"/> Fall Protection<br><input type="checkbox"/> LPO conducted ( <u>specify job/JLA</u> )<br><input type="checkbox"/><br><input type="checkbox"/> | <input type="checkbox"/> Isolation<br><input type="checkbox"/> Monitoring<br><input type="checkbox"/> Respiratory Protection<br><input type="checkbox"/> Decon Procedures<br><input type="checkbox"/> Work Zones/Site Control<br><input type="checkbox"/> Traffic Control<br><input type="checkbox"/> Other ( <u>specify</u> )<br><input type="checkbox"/><br><input type="checkbox"/> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Signature and Certification Section - Site Staff and Visitors

| Name/Company/Signature | Initial & Sign in Time | Initial & Sign out Time | I have read and understand the |
|------------------------|------------------------|-------------------------|--------------------------------|
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |
|                        |                        |                         |                                |

| Important Information and Numbers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Visitor Name/Co - not involved in work                                                                                                                                                                                                                                                            | I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment. |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|--|----|-----|--|--|----|-----|--|--|----|-----|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.</p> <p>In the event of an injury, employees will call WorkCare at 1.800.455.6155 and then notify the field supervisor who will, in turn, notify Corp H&amp;S at 1.720.344.3844.</p> <p>In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&amp;S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.</p> <p>In the event of a utility strike or other damage to property of a client or 3rd party, employees will immediately notify the field supervisor, who will then immediately notify Corp Legal at 1.678.373.9556 and Corp H&amp;S at</p> | <table style="width: 100%;"> <tr><td>In</td><td>Out</td></tr> <tr><td> </td><td> </td></tr> <tr><td>In</td><td>Out</td></tr> <tr><td> </td><td> </td></tr> <tr><td>In</td><td>Out</td></tr> <tr><td> </td><td> </td></tr> <tr><td>In</td><td>Out</td></tr> <tr><td> </td><td> </td></tr> </table> | In                                                                                                                                                                                                              | Out |  |  | In | Out |  |  | In | Out |  |  | In | Out |  |  | <p><b>I will be</b> alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.</p> <p>If it is necessary to <b>STOP THE JOB</b>, I will perform <b>TRACK</b>; and then amend the hazard assessments or the HASP as needed.</p> <p><b>I will not assist</b> a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.</p> |
| In                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Out                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| In                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Out                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| In                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Out                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| In                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Out                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                 |     |  |  |    |     |  |  |    |     |  |  |    |     |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

|                          |                                                             |
|--------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> | Lessons learned and best practices learned today: _____     |
| <input type="checkbox"/> | Incidents that occurred today: _____                        |
| <input type="checkbox"/> | Any Stop Work interventions today? _____                    |
| <input type="checkbox"/> | Corrective/Preventive Actions needed for future work: _____ |
| <input type="checkbox"/> | Any other H&S issues: _____                                 |

**Keep H&S 1<sup>st</sup> in all things**

WorkCare - 1.800.455.6155

# **Appendix B**

## **Material Safety Data Sheets**

# MATERIAL SAFETY DATA SHEET

-----  
**THE BIOSOLVE® COMPANY**  
**329 Massachusetts Avenue**  
**Lexington, Massachusetts 02420 USA**

Ref. No.: 2001  
Date: 7/26/2010

Phone: +1 (781) 482-7900 Fax: +1 (781) 482-7909  
Emergency Phone-24 Hours: +1 (800) 225-3909

E-Mail: info@biosolve.com  
Web Site: www.biosolve.com

## SECTION I - IDENTITY

Name: **BioSolve®**  
CAS #: 138757-63-8  
Formula: Proprietary  
Chemical Family: Water Based, Biodegradable, Wetting Agents & Surfactants  
HMIS Code: Health 1, Fire 0, Reactivity 0  
HMIS Key: 4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant

## SECTION II - HAZARDOUS INGREDIENTS

Massachusetts Right to Know Law or 29 C.F.R. (Code of Federal Regulations) 1910.1000 require listing of hazardous ingredients.

This product does not contain any hazardous ingredients as defined by CERCLA, Massachusetts Right to Know Law and California's Prop. 65.

**DOT Class: Not Regulated/Non Hazardous**

## SECTION III - PHYSICAL - CHEMICAL CHARACTERISTICS

|                              |                            |                         |                  |
|------------------------------|----------------------------|-------------------------|------------------|
| Boiling Point                | : 265°F                    | Specific Gravity        | : 1.00 +/-0.01   |
| Melting Point                | : 32°F                     | Vapor Pressure mm/Hg    | : Not Applicable |
| Surface Tension- 6% Solution | : 29.1 Dyne/cm at 25°C     | Vapor Density Air = 1   | : Not Applicable |
| Reactivity with Water        | : No                       | Viscosity - Concentrate | : 490 Centipoise |
| Evaporation Rate             | : >1 as compared to Water  | Viscosity - 6% Solution | : 15 Centipoise  |
| Appearance                   | : Clear Liquid unless Dyed | Solubility in Water     | : Complete       |
| Odor                         | : Pleasant Fragrance       | pH                      | : 9.1+/-0.3      |
| Pounds per Gallon            | : 8.38                     |                         |                  |

## SECTION IV - FIRE AND EXPLOSION DATA

|                                    |         |                         |                  |
|------------------------------------|---------|-------------------------|------------------|
| Special Fire Fighting Procedures   | : None  | Flammable Limit         | : None           |
| Unusual Fire and Explosion Hazards | : None  | Auto Ignite Temperature | : None           |
| Solvent for Clean-Up               | : Water | Fire Extinguisher Media | : Not Applicable |
| Flash Point                        | : None  |                         |                  |

**SECTION V - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES**

Precautions to be taken in Handling and Storage: Use good normal hygiene.

Precautions to be taken in case of Spill or Leak -

Small spills, in an undiluted form, contain. Soak up with absorbent materials.

Large spills, in an undiluted form, dike and contain. Remove with vacuum truck or pump to storage/salvage vessel. Soak up residue with absorbent materials.

Waste Disposal Procedures -

Dispose in an approved disposal area or in a manner which complies with all local, provincial, and federal regulations.

**SECTION VI - HEALTH HAZARDS**

Threshold Limit Values: Not applicable

Signs and Symptoms of Over Exposure-

Acute : Moderate eye irritation. Skin: Causes redness, edema, drying of skin.

Chronic: Pre-existing skin and eye disorders may be aggravated by contact with this product.

Medical Conditions Generally Aggravated by Exposure: Unknown

Carcinogen: No

**Emergency First Aid Procedures -**

Eyes: Flush thoroughly with water for 15 minutes. Get medical attention.

Skin: Remove contaminated clothing. Wash exposed areas with soap and water.

Wash clothing before reuse. Get medical attention if irritation develops.

Ingestion: Get medical attention.

Inhalation: None considered necessary.

**SECTION VII - SPECIAL PROTECTION INFORMATION**

Respiratory Protection : Not necessary Local Exhaust Required : No, except in confined space as required.

Ventilation : Normal Protective Clothing : Neoprene or other chemical resistant gloves, safety goggles or chemical face shield.  
Required Wash clothing before reuse.

*WHEN UTILIZED IN CONFINED SPACE OPERATIONS, ADDITIONAL PPE MAY BE REQUIRED AS PER OSHA GUIDELINES.*

**SECTION VIII - PHYSICAL HAZARDS**

Stability : Stable Incompatible Substances : None Known

Polymerization : No Hazardous Decomposition Products : None Known

**SECTION IX - TRANSPORT & STORAGE**

DOT Class : Not Regulated/Non Hazardous

Freeze Temperature : 28°F

Storage : 35°F-120°F

Freeze Harm : None (thaw & stir)

Shelf Life : Unlimited Unopened

**SECTION X - REGULATORY INFORMATION**

The Information on this Material Safety Data Sheet reflects the latest information and data that we have on hazards, properties, and handling of this product under the recommended conditions of use. Any use of this product or method of application, which is not described on the Product label or in this Material Safety Data Sheet, is the sole responsibility of the user. This Material Safety Data Sheet was prepared to comply with the OSHA Hazardous Communication Regulation and Massachusetts Right to Know Law.



## 1. Identification

|                                                               |                                             |
|---------------------------------------------------------------|---------------------------------------------|
| Product identifier                                            | Hydrogen Release Compound (HRC®)            |
| Other means of identification                                 | None.                                       |
| Recommended use                                               | Remediation of soils and groundwater.       |
| Recommended restrictions                                      | None known.                                 |
| <b>Manufacturer/Importer/Supplier/Distributor information</b> |                                             |
| Company Name                                                  | Regenesi                                    |
| Address                                                       | 1011 Calle Sombra<br>San Clemente, CA 92673 |
| Telephone                                                     | 949-366-8000                                |
| E-mail                                                        | CustomerService@regenesi.com                |
| Emergency phone number                                        | CHEMTREC® at 1-800-424-9300 (International) |

## 2. Hazard(s) identification

|                      |                                   |            |
|----------------------|-----------------------------------|------------|
| Physical hazards     | Not classified.                   |            |
| Health hazards       | Skin corrosion/irritation         | Category 2 |
|                      | Serious eye damage/eye irritation | Category 1 |
| OSHA defined hazards | Not classified.                   |            |
| Label elements       |                                   |            |



|                                           |                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signal word                               | Danger                                                                                                                                                                                                                                                                                                                          |
| Hazard statement                          | Causes skin irritation. Causes serious eye damage.                                                                                                                                                                                                                                                                              |
| Precautionary statement                   |                                                                                                                                                                                                                                                                                                                                 |
| Prevention                                | Wash thoroughly after handling. Wear protective gloves. Wear eye/face protection.                                                                                                                                                                                                                                               |
| Response                                  | If on skin: Wash with plenty of water. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. |
| Storage                                   | Store away from incompatible materials.                                                                                                                                                                                                                                                                                         |
| Disposal                                  | Dispose of waste and residues in accordance with local authority requirements.                                                                                                                                                                                                                                                  |
| Hazard(s) not otherwise classified (HNOC) | None known.                                                                                                                                                                                                                                                                                                                     |

## 3. Composition/information on ingredients

| <b>Mixtures</b>         |             |       |
|-------------------------|-------------|-------|
| Chemical name           | CAS number  | %     |
| Glycerol Tripolylactate | 201167-72-8 | 62-67 |
| Glycerin                | 56-81-5     | 33-38 |
| Lactic acid             | 50-21-5     | <10   |

|                      |                                                                         |
|----------------------|-------------------------------------------------------------------------|
| Composition comments | All concentrations are in percent by weight unless otherwise indicated. |
|----------------------|-------------------------------------------------------------------------|

## 4. First-aid measures

|            |                                                                     |
|------------|---------------------------------------------------------------------|
| Inhalation | Move to fresh air. Call a physician if symptoms develop or persist. |
|------------|---------------------------------------------------------------------|

|                                                                               |                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Skin contact</b>                                                           | Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.                                           |
| <b>Eye contact</b>                                                            | Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.                                   |
| <b>Ingestion</b>                                                              | Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting without advice from poison control center. Get medical attention if symptoms occur. |
| <b>Most important symptoms/effects, acute and delayed</b>                     | Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain.     |
| <b>Indication of immediate medical attention and special treatment needed</b> | Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.                                                                                        |
| <b>General information</b>                                                    | Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.                                                                                              |

5. Fire-fighting measures

|                                                                      |                                                                                                                                              |
|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Suitable extinguishing media</b>                                  | Water spray. Carbon dioxide (CO2). Dry chemical powder. Foam.                                                                                |
| <b>Unsuitable extinguishing media</b>                                | Do not use water jet as an extinguisher, as this will spread the fire.                                                                       |
| <b>Specific hazards arising from the chemical</b>                    | During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, phosphorus compounds and metal oxides. |
| <b>Special protective equipment and precautions for firefighters</b> | Self-contained breathing apparatus and full protective clothing must be worn in case of fire.                                                |
| <b>Fire fighting equipment/instructions</b>                          | Move containers from fire area if you can do so without risk. Water spray should be used to cool containers.                                 |
| <b>Specific methods</b>                                              | Use standard firefighting procedures and consider the hazards of other involved materials.                                                   |
| <b>General fire hazards</b>                                          | No unusual fire or explosion hazards noted.                                                                                                  |

6. Accidental release measures

|                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Personal precautions, protective equipment and emergency procedures</b> | Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.                                                                                                                                                                                  |
| <b>Methods and materials for containment and cleaning up</b>               | Large Spills: Stop the flow of material, if this is without risk. Use water spray to reduce vapors or divert vapor cloud drift. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.<br><br>Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.<br><br>Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS. |
| <b>Environmental precautions</b>                                           | Avoid discharge into drains, water courses or onto the ground.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

7. Handling and storage

|                                                                     |                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Precautions for safe handling</b>                                | Do not get this material in contact with eyes. Avoid contact with eyes, skin, and clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.                                                                   |
| <b>Conditions for safe storage, including any incompatibilities</b> | Store in original tightly closed container. Store in a cool, dry, well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS). Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass. |

8. Exposure controls/personal protection

Occupational exposure limits  
US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

| Components             | Type | Value    | Form                 |
|------------------------|------|----------|----------------------|
| Glycerin (CAS 56-81-5) | PEL  | 5 mg/m3  | Respirable fraction. |
|                        |      | 15 mg/m3 | Total dust.          |

|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Biological limit values                                               | No biological exposure limits noted for the ingredient(s).                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Appropriate engineering controls                                      | Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product. |
| Individual protection measures, such as personal protective equipment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Eye/face protection                                                   | Wear approved, tight fitting indirect vented or non-vented safety goggles where splashing is probable. Face shield is recommended.                                                                                                                                                                                                                                                                                                                                                   |
| Skin protection                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Hand protection                                                       | Wear appropriate chemical resistant gloves. Rubber or vinyl-coated gloves are recommended.                                                                                                                                                                                                                                                                                                                                                                                           |
| Other                                                                 | Wear appropriate chemical resistant clothing.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Respiratory protection                                                | If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.                                                                                                                                                                                                                                  |
| Thermal hazards                                                       | Wear appropriate thermal protective clothing, when necessary.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| General hygiene considerations                                        | Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.                                                                                                                                                                                                                                                                |

9. Physical and chemical properties

|                                              |                       |
|----------------------------------------------|-----------------------|
| Appearance                                   |                       |
| Physical state                               | Liquid.               |
| Form                                         | Viscous gel/liquid.   |
| Color                                        | Amber.                |
| Odor                                         | Odorless.             |
| Odor threshold                               | Not available.        |
| pH                                           | 3 (3% solution/water) |
| Melting point/freezing point                 | Not available.        |
| Initial boiling point and boiling range      | Not available.        |
| Flash point                                  | Not available.        |
| Evaporation rate                             | Not available.        |
| Flammability (solid, gas)                    | Not applicable.       |
| Upper/lower flammability or explosive limits |                       |
| Flammability limit - lower (%)               | Not available.        |
| Flammability limit - upper (%)               | Not available.        |
| Explosive limit - lower (%)                  | Not available.        |
| Explosive limit - upper (%)                  | Not available.        |
| Vapor pressure                               | Not available.        |
| Vapor density                                | Not available.        |
| Relative density                             | 1.1 - 1.3             |
| Solubility(ies)                              |                       |
| Solubility (water)                           | Not available.        |
| Solubility (other)                           | Acetone and DMSO.     |
| Partition coefficient (n-octanol/water)      | Not available.        |
| Auto-ignition temperature                    | Not available.        |
| Decomposition temperature                    | Not available.        |
| Viscosity                                    | 20,000 - 40,000 cP    |

10. Stability and reactivity

|            |                                                                                               |
|------------|-----------------------------------------------------------------------------------------------|
| Reactivity | The product is stable and non-reactive under normal conditions of use, storage and transport. |
|------------|-----------------------------------------------------------------------------------------------|

|                                    |                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------|
| Chemical stability                 | Undergoes hydrolysis in water to form lactic acid and glycerol.                                     |
| Possibility of hazardous reactions | No dangerous reaction known under conditions of normal use.                                         |
| Conditions to avoid                | Avoid temperatures exceeding the flash point. Contact with incompatible materials.                  |
| Incompatible materials             | Strong oxidizing agents. Bases. Acids.                                                              |
| Hazardous decomposition products   | Thermal decomposition or combustion may produce: carbon oxides, phosphorus compounds, metal oxides. |

11. Toxicological information

Information on likely routes of exposure

|                                                                              |                                                                                                                                                                                                           |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inhalation                                                                   | May cause irritation to the respiratory system.                                                                                                                                                           |
| Skin contact                                                                 | Causes skin irritation.                                                                                                                                                                                   |
| Eye contact                                                                  | Causes serious eye damage.                                                                                                                                                                                |
| Ingestion                                                                    | Ingestion may cause irritation and malaise.                                                                                                                                                               |
| Symptoms related to the physical, chemical and toxicological characteristics | Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain. |

Information on toxicological effects

Acute toxicity

| Components                                                     | Species                                                                                                          | Test Results |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------|
| Glycerin (CAS 56-81-5)                                         |                                                                                                                  |              |
| Acute                                                          |                                                                                                                  |              |
| Oral                                                           |                                                                                                                  |              |
| LD50                                                           | Rat                                                                                                              | 12600 mg/kg  |
| Skin corrosion/Irritation                                      | Causes skin irritation.                                                                                          |              |
| Serious eye damage/eye irritation                              | Causes serious eye damage.                                                                                       |              |
| Respiratory or skin sensitization                              |                                                                                                                  |              |
| Respiratory sensitization                                      | Not a respiratory sensitizer.                                                                                    |              |
| Skin sensitization                                             | This product is not expected to cause skin sensitization.                                                        |              |
| Germ cell mutagenicity                                         | No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic. |              |
| Carcinogenicity                                                | This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.                                  |              |
| OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050) |                                                                                                                  |              |
| Not listed.                                                    |                                                                                                                  |              |
| Reproductive toxicity                                          | This product is not expected to cause reproductive or developmental effects.                                     |              |
| Specific target organ toxicity - single exposure               | Not classified.                                                                                                  |              |
| Specific target organ toxicity - repeated exposure             | Not classified.                                                                                                  |              |
| Aspiration hazard                                              | Not an aspiration hazard.                                                                                        |              |

12. Ecological information

|                                                   |                                                                                                                                                                                                    |       |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Ecotoxicity                                       | The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment. |       |
| Persistence and degradability                     | Material is readily degradable and undergoes hydrolysis in several hours.                                                                                                                          |       |
| Bioaccumulative potential                         | No data available.                                                                                                                                                                                 |       |
| Partition coefficient n-octanol / water (log Kow) |                                                                                                                                                                                                    |       |
| Glycerin (CAS 56-81-5)                            |                                                                                                                                                                                                    | -1.76 |
| Lactic acid (CAS 50-21-5)                         |                                                                                                                                                                                                    | -0.72 |
| Mobility in soil                                  | No data available.                                                                                                                                                                                 |       |
| Other adverse effects                             | None known.                                                                                                                                                                                        |       |

13. Disposal considerations

|                                       |                                                                                                                                                                                                                  |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disposal Instructions                 | Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.                         |
| Local disposal regulations            | Dispose in accordance with all applicable regulations.                                                                                                                                                           |
| Hazardous waste code                  | The waste code should be assigned in discussion between the user, the producer and the waste disposal company.                                                                                                   |
| Waste from residues / unused products | Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions). |
| Contaminated packaging                | Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.       |

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not established.

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

One or more components are not listed on TSCA.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes  
Delayed Hazard - No  
Fire Hazard - No  
Pressure Hazard - No  
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical

Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)

Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Glycerin (CAS 56-81-5)

**US. New Jersey Worker and Community Right-to-Know Act**

Glycerin (CAS 56-81-5)

**US. Pennsylvania Worker and Community Right-to-Know Law**

Glycerin (CAS 56-81-5)

**US. Rhode Island RTK**

Not regulated.

**US. California Proposition 65**

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

**International Inventories**

| Country(s) or region        | Inventory name                                                         | On inventory (yes/no)* |
|-----------------------------|------------------------------------------------------------------------|------------------------|
| Australia                   | Australian Inventory of Chemical Substances (AICS)                     | Yes                    |
| Canada                      | Domestic Substances List (DSL)                                         | Yes                    |
| Canada                      | Non-Domestic Substances List (NDSL)                                    | Yes                    |
| China                       | Inventory of Existing Chemical Substances in China (IECSC)             | Yes                    |
| Europe                      | European Inventory of Existing Commercial Chemical Substances (EINECS) | Yes                    |
| Europe                      | European List of Notified Chemical Substances (ELINCS)                 | No                     |
| Japan                       | Inventory of Existing and New Chemical Substances (ENCS)               | Yes                    |
| Korea                       | Existing Chemicals List (ECL)                                          | Yes                    |
| New Zealand                 | New Zealand Inventory                                                  | Yes                    |
| Philippines                 | Philippine Inventory of Chemicals and Chemical Substances (PICCS)      | Yes                    |
| United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory                          | Yes                    |

\*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

|                     |                                                                                          |
|---------------------|------------------------------------------------------------------------------------------|
| Issue date          | 10-April-2015                                                                            |
| Revision date       | -                                                                                        |
| Version #           | 01                                                                                       |
| Further information | HMIS® is a registered trade and service mark of the American Coatings Association (ACA). |
| HMIS® ratings       | Health: 3<br>Flammability: 1<br>Physical hazard: 0                                       |

**NFPA ratings****Disclaimer**

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.



# SAFETY DATA SHEET



Acetone

## Section 1. Identification

|                                                             |                                                                                                                               |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>GHS product identifier</b>                               | : Acetone                                                                                                                     |
| <b>Chemical name</b>                                        | : acetone                                                                                                                     |
| <b>Other means of identification</b>                        | : propan-2-one; propanone; 2-Propanone; dimethyl ketone                                                                       |
| <b>Product use</b>                                          | : Synthetic/Analytical chemistry.                                                                                             |
| <b>Synonym</b>                                              | : propan-2-one; propanone; 2-Propanone; dimethyl ketone                                                                       |
| <b>SDS #</b>                                                | : 001088                                                                                                                      |
| <b>Supplier's details</b>                                   | : Airgas USA, LLC and its affiliates<br>259 North Radnor-Chester Road<br>Suite 100<br>Radnor, PA 19087-5283<br>1-610-687-5253 |
| <b>Emergency telephone number (with hours of operation)</b> | : 1-866-734-3438                                                                                                              |

## Section 2. Hazards identification

|                                                   |                                                                                                                                                                         |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OSHA/HCS status</b>                            | : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).                                                                   |
| <b>Classification of the substance or mixture</b> | : FLAMMABLE LIQUIDS - Category 2<br>SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2<br>SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3 |

### GHS label elements

**Hazard pictograms**



**Signal word**

: Danger

**Hazard statements**

: Highly flammable liquid and vapor.  
May form explosive mixtures with air.  
Causes serious eye irritation.  
May cause drowsiness and dizziness.

### Precautionary statements

**General**

: Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention**

: Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing vapor. Wash hands thoroughly after handling.

**Date of issue/Date of revision**

: 4/26/2015.

**Date of previous issue**

: 10/21/2014.

**Version** : 0.02

1/14

## Section 2. Hazards identification

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Response</b>                         | : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. |
| <b>Storage</b>                          | : Store locked up. Store in a well-ventilated place. Keep cool.                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Disposal</b>                         | : Dispose of contents and container in accordance with all local, regional, national and international regulations.                                                                                                                                                                                                                                                                                                                                 |
| <b>Hazards not otherwise classified</b> | : None known.                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Section 3. Composition/information on ingredients

|                                      |                                                         |
|--------------------------------------|---------------------------------------------------------|
| <b>Substance/mixture</b>             | : Substance                                             |
| <b>Chemical name</b>                 | : acetone                                               |
| <b>Other means of identification</b> | : propan-2-one; propanone; 2-Propanone; dimethyl ketone |

### CAS number/other identifiers

|                     |           |
|---------------------|-----------|
| <b>CAS number</b>   | : 67-64-1 |
| <b>Product code</b> | : 001088  |

| <b>Ingredient name</b> | <b>%</b> | <b>CAS number</b> |
|------------------------|----------|-------------------|
| acetone                | 100      | 67-64-1           |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Inhalation</b>   | : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |
| <b>Skin contact</b> | : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ingestion</b>    | : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention.                   |



## Section 4. First aid measures

immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

#### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any

## Section 5. Fire-fighting measures

- waterway, sewer or drain.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide
- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking

## Section 7. Handling and storage

### Advice on general occupational hygiene

tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

### Conditions for safe storage, including any incompatibilities

- : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| acetone         | <p><b>ACGIH TLV (United States, 3/2012).</b><br/>           STEL: 1782 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 750 ppm 15 minutes.<br/>           TWA: 1188 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 500 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 1/2013).</b><br/>           TWA: 590 mg/m<sup>3</sup> 10 hours.<br/>           TWA: 250 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6/2010).</b><br/>           TWA: 2400 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 1000 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b><br/>           STEL: 2400 mg/m<sup>3</sup> 15 minutes.<br/>           STEL: 1000 ppm 15 minutes.<br/>           TWA: 1800 mg/m<sup>3</sup> 8 hours.<br/>           TWA: 750 ppm 8 hours.</p> |

### Appropriate engineering controls

- : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

### Environmental exposure controls

- : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

## Section 8. Exposure controls/personal protection

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid. [COLORLESS LIQUID WITH A FRAGRANT, MINT-LIKE ODOR]
- Color** : Colorless.
- Molecular weight** : 58.09 g/mole
- Molecular formula** : C<sub>3</sub>H<sub>6</sub>O
- Boiling/condensation point** : 56.05°C (132.9°F)
- Melting/freezing point** : -94.7°C (-138.5°F)
- Critical temperature** : 234.85°C (454.7°F)
- Odor** : Characteristic.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Closed cup: -20°C (-4°F)
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : 6.06 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 2.5%  
Upper: 13%
- Vapor pressure** : 24 kPa (180.014626188 mm Hg) [room temperature]

## Section 9. Physical and chemical properties

|                                        |                  |
|----------------------------------------|------------------|
| Vapor density                          | : 2 (Air = 1)    |
| Specific Volume (ft <sup>3</sup> /lb)  | : 1.2642         |
| Gas Density (lb/ft <sup>3</sup> )      | : 0.791          |
| Relative density                       | : 0.8            |
| Solubility                             | : Not available. |
| Solubility in water                    | : Not available. |
| Partition coefficient: n-octanol/water | : -0.23          |
| Auto-ignition temperature              | : 465°C (869°F)  |
| Decomposition temperature              | : Not available. |
| SADT                                   | : Not available. |
| Viscosity                              | : Not available. |

## Section 10. Stability and reactivity

|                                         |                                                                                                                                                                                                                                      |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reactivity                              | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| Chemical stability                      | : The product is stable.                                                                                                                                                                                                             |
| Possibility of hazardous reactions      | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| Conditions to avoid                     | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |
| Incompatibility with various substances | : Extremely reactive or incompatible with the following materials: oxidizing materials.                                                                                                                                              |
| Hazardous decomposition products        | : Under normal conditions of storage and use, hazardous decomposition products should not be produced.                                                                                                                               |
| Hazardous polymerization                | : Under normal conditions of storage and use, hazardous polymerization will not occur.                                                                                                                                               |

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/ingredient name | Result                             | Species    | Dose                    | Exposure     |
|-------------------------|------------------------------------|------------|-------------------------|--------------|
| acetone                 | LC50 Inhalation Vapor<br>LD50 Oral | Rat<br>Rat | 59528 ppm<br>5800 mg/kg | 1 hours<br>- |

#### Irritation/Corrosion

## Section 11. Toxicological information

| Product/ingredient name | Result                   | Species | Score | Exposure                 | Observation |
|-------------------------|--------------------------|---------|-------|--------------------------|-------------|
| acetone                 | Eyes - Mild irritant     | Human   | -     | 186300 parts per million | -           |
|                         | Eyes - Mild irritant     | Rabbit  | -     | 10 microliters           | -           |
|                         | Eyes - Moderate irritant | Rabbit  | -     | 24 hours 20 milligrams   | -           |
|                         | Eyes - Severe irritant   | Rabbit  | -     | 20 milligrams            | -           |
|                         | Skin - Mild irritant     | Rabbit  | -     | 24 hours 500 milligrams  | -           |
|                         | Skin - Mild irritant     | Rabbit  | -     | 395 milligrams           | -           |

### Sensitization

Not available.

### Mutagenicity

Not available.

### Carcinogenicity

Not available.

### Reproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

| Name    | Category   | Route of exposure | Target organs    |
|---------|------------|-------------------|------------------|
| acetone | Category 3 | Not applicable.   | Narcotic effects |

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

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

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness

## Section 11. Toxicological information

|                     |                                                                                                                                               |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Inhalation</b>   | : Adverse symptoms may include the following:<br>nausea or vomiting<br>headache<br>drowsiness/fatigue<br>dizziness/vertigo<br>unconsciousness |
| <b>Skin contact</b> | : No specific data.                                                                                                                           |
| <b>Ingestion</b>    | : No specific data.                                                                                                                           |

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Long term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Potential chronic health effects

Not available.

|                              |                                                     |
|------------------------------|-----------------------------------------------------|
| <b>General</b>               | : No known significant effects or critical hazards. |
| <b>Carcinogenicity</b>       | : No known significant effects or critical hazards. |
| <b>Mutagenicity</b>          | : No known significant effects or critical hazards. |
| <b>Teratogenicity</b>        | : No known significant effects or critical hazards. |
| <b>Developmental effects</b> | : No known significant effects or critical hazards. |
| <b>Fertility effects</b>     | : No known significant effects or critical hazards. |

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

| Product/ingredient name | Result                              | Species                                                                | Exposure |
|-------------------------|-------------------------------------|------------------------------------------------------------------------|----------|
| acetone                 | Acute EC50 20.565 mg/l Marine water | Algae - Ulva pertusa                                                   | 96 hours |
|                         | Acute LC50 6000000 µg/l Fresh water | Crustaceans - Gammarus pulex                                           | 48 hours |
|                         | Acute LC50 10000 µg/l Fresh water   | Daphnia - Daphnia magna                                                | 48 hours |
|                         | Acute LC50 100 mg/l Fresh water     | Fish - Pimephales promelas - Juvenile (Fledgling, Hatchling, Weanling) | 96 hours |
|                         | Chronic NOEC 4.95 mg/l Marine water | Algae - Ulva pertusa                                                   | 96 hours |
|                         | Chronic NOEC 0.1 ml/L Fresh water   | Daphnia - Daphnia magna - Neonate                                      | 21 days  |

### Persistence and degradability

Not available.

## Section 12. Ecological information

### Bioaccumulative potential

| Product/ingredient name | LogP <sub>ow</sub> | BCF | Potential |
|-------------------------|--------------------|-----|-----------|
| acetone                 | -0.23              | -   | low       |

### Mobility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

### United States - RCRA Toxic hazardous waste "U" List

| Ingredient                   | CAS #   | Status | Reference number |
|------------------------------|---------|--------|------------------|
| Acetone (I); 2-Propanone (I) | 67-64-1 | Listed | U002             |

## Section 14. Transport information

|                            | DOT                                                                                      | TDG                                                                                      | Mexico                                                                                   | IMDG                                                                                       | IATA                                                                                       |
|----------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| UN number                  | UN1090                                                                                   | UN1090                                                                                   | UN1090                                                                                   | UN1090                                                                                     | UN1090                                                                                     |
| UN proper shipping name    | ACETONE                                                                                  | ACETONE                                                                                  | ACETONE                                                                                  | ACETONE (ACETONE SOLUTIONS)                                                                | ACETONE                                                                                    |
| Transport hazard class(es) | 3<br> | 3<br> | 3<br> | 3<br> | 3<br> |
| Packing group              | II                                                                                       | II                                                                                       | -                                                                                        | II                                                                                         | II                                                                                         |
| Environment                | No.                                                                                      | No.                                                                                      | No.                                                                                      | No.                                                                                        | No.                                                                                        |
|                            |                                                                                          |                                                                                          |                                                                                          |                                                                                            |                                                                                            |

Date of issue/Date of revision : 4/26/2015. Date of previous issue : 10/21/2014. Version : 0.02 10/14



## Section 14. Transport information

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                          |   |   |                                                                                                                                                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Additional information</b> | <b>Reportable quantity</b><br>5000 lbs / 2270 kg [758.12 gal / 2869.8 L]<br>Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.<br><br><b>Limited quantity</b><br>Yes.<br><br><b>Packaging instruction</b><br><b>Passenger aircraft</b><br>Quantity limitation: 5 L<br><br><b>Cargo aircraft</b><br>Quantity limitation: 60 L<br><br><b>Special provisions</b><br>IB2, T4, TP1 | <b>Explosive Limit and Limited Quantity Index</b><br>1<br><br><b>Passenger Carrying Ship Index</b><br>Forbidden<br><br><b>Passenger Carrying Road or Rail Index</b><br>5 | - | - | <b>Passenger and Cargo Aircraft</b> Quantity limitation: 5 L<br><b>Cargo Aircraft Only Limited Quantities - Passenger Aircraft</b> Quantity limitation: 1 L |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined  
**United States inventory (TSCA 8b):** This material is listed or exempted.

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Listed

### SARA 302/304

#### Composition/information on ingredients

No products were found.

**SARA 304 RQ** : Not applicable.

### SARA 311/312

## Section 15. Regulatory information

**Classification** : Fire hazard  
Immediate (acute) health hazard

### Composition/information on ingredients

| Name    | %   | Fire hazard | Sudden release of pressure | Reactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|---------|-----|-------------|----------------------------|----------|---------------------------------|---------------------------------|
| acetone | 100 | Yes.        | No.                        | No.      | Yes.                            | No.                             |

### State regulations

**Massachusetts** : This material is listed.  
**New York** : This material is listed.  
**New Jersey** : This material is listed.  
**Pennsylvania** : This material is listed.  
**Canada inventory** : This material is listed or exempted.

### International regulations

**International lists** : **Australia inventory (AICS)**: This material is listed or exempted.  
**China inventory (IECSC)**: This material is listed or exempted.  
**Japan inventory**: This material is listed or exempted.  
**Korea inventory**: This material is listed or exempted.  
**Malaysia Inventory (EHS Register)**: Not determined.  
**New Zealand Inventory of Chemicals (NZIoC)**: This material is listed or exempted.  
**Philippines inventory (PICCS)**: This material is listed or exempted.  
**Taiwan inventory (CSNN)**: Not determined.

**Chemical Weapons Convention List Schedule I Chemicals** : Not listed

**Chemical Weapons Convention List Schedule II Chemicals** : Not listed

**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

### Canada

**WHMIS (Canada)** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).  
**CEPA Toxic substances**: This material is listed.  
**Canadian ARET**: This material is not listed.  
**Canadian NPRI**: This material is listed.  
**Alberta Designated Substances**: This material is not listed.  
**Ontario Designated Substances**: This material is not listed.  
**Quebec Designated Substances**: This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous Material Information System (U.S.A.)

|              |   |   |
|--------------|---|---|
| Health       | * | 2 |
| Flammability |   | 3 |

## Section 16. Other information

### Physical hazards

0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of printing               | : 4/26/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Date of issue/Date of revision | : 4/26/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Date of previous issue         | : 10/21/2014.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Version                        | : 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Key to abbreviations           | : ATE = Acute Toxicity Estimate<br>BCF = Bioconcentration Factor<br>GHS = Globally Harmonized System of Classification and Labelling of Chemicals<br>IATA = International Air Transport Association<br>IBC = Intermediate Bulk Container<br>IMDG = International Maritime Dangerous Goods<br>LogPow = logarithm of the octanol/water partition coefficient<br>MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)<br>UN = United Nations<br>ACGIH – American Conference of Governmental Industrial Hygienists<br>AIHA – American Industrial Hygiene Association<br>CAS – Chemical Abstract Services<br>CEPA – Canadian Environmental Protection Act<br>CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)<br>CFR – United States Code of Federal Regulations<br>CPR – Controlled Products Regulations<br>DSL – Domestic Substances List<br>GWP – Global Warming Potential<br>IARC – International Agency for Research on Cancer<br>ICAO – International Civil Aviation Organisation<br>Inh – Inhalation<br>LC – Lethal concentration |

## Section 16. Other information

LD – Lethal dosage  
NDSL – Non-Domestic Substances List  
NIOSH – National Institute for Occupational Safety and Health  
TDG – Canadian Transportation of Dangerous Goods Act and Regulations  
TLV – Threshold Limit Value  
TSCA – Toxic Substances Control Act  
WEEL – Workplace Environmental Exposure Level  
WHMIS – Canadian Workplace Hazardous Material Information System

### References

: Not available.

✔ Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

# SAFETY DATA SHEET



Ethanol

## Section 1. Identification

|                                                             |                                                                                                                               |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>GHS product identifier</b>                               | : Ethanol                                                                                                                     |
| <b>Chemical name</b>                                        | : ethanol                                                                                                                     |
| <b>Other means of identification</b>                        | : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)                                                          |
| <b>Product use</b>                                          | : Synthetic/Analytical chemistry.                                                                                             |
| <b>Synonym</b>                                              | : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)                                                          |
| <b>SDS #</b>                                                | : 001114                                                                                                                      |
| <b>Supplier's details</b>                                   | : Airgas USA, LLC and its affiliates<br>259 North Radnor-Chester Road<br>Suite 100<br>Radnor, PA 19087-5283<br>1-610-687-5253 |
| <b>Emergency telephone number (with hours of operation)</b> | : 1-866-734-3438                                                                                                              |

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : FLAMMABLE LIQUIDS - Category 2

### GHS label elements

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : Highly flammable liquid and vapor.  
May form explosive mixtures with air.

### Precautionary statements

**General** : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention** : Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use and store only outdoors or in a well ventilated place.

**Response** : IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

**Storage** : Store in a well-ventilated place. Keep cool.

**Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Hazards not otherwise classified** : None known.

**Date of issue/Date of revision**

: 5/18/2015.

**Date of previous issue**

: 10/28/2014.

**Version** : 0.02

1/12

## Section 3. Composition/information on ingredients

**Substance/mixture** : Substance  
**Chemical name** : ethanol  
**Other means of identification** : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)

### CAS number/other identifiers

**CAS number** : 64-17-5  
**Product code** : 001114

| Ingredient name | %   | CAS number |
|-----------------|-----|------------|
| ethanol         | 100 | 64-17-5    |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

**Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.  
**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.  
**Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.  
**Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

#### Potential acute health effects

**Eye contact** : No known significant effects or critical hazards.  
**Inhalation** : No known significant effects or critical hazards.  
**Skin contact** : No known significant effects or critical hazards.  
**Frostbite** : Try to warm up the frozen tissues and seek medical attention.  
**Ingestion** : No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

**Eye contact** : No specific data.

## Section 4. First aid measures

- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).



## Section 6. Accidental release measures

### Methods and materials for containment and cleaning up

#### Small spill

- : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

#### Large spill

- : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

#### Protective measures

- : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

#### Advice on general occupational hygiene

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

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

- : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ethanol         | <b>ACGIH TLV (United States, 3/2012).</b><br>STEL: 1000 ppm 15 minutes.<br><b>OSHA PEL 1989 (United States, 3/1989).</b><br>TWA: 1000 ppm 8 hours.<br>TWA: 1900 mg/m <sup>3</sup> 8 hours.<br><b>NIOSH REL (United States, 1/2013).</b><br>TWA: 1000 ppm 10 hours.<br>TWA: 1900 mg/m <sup>3</sup> 10 hours. |



## Section 8. Exposure controls/personal protection

**OSHA PEL (United States, 6/2010).**

TWA: 1000 ppm 8 hours.

TWA: 1900 mg/m<sup>3</sup> 8 hours.

**Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

### Skin protection

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

**Physical state** : Liquid. [CLEAR, COLORLESS LIQUID WITH A WEAK, ETHEREAL, VINOUS ODOR]

**Color** : Colorless. Clear.

**Molecular weight** : 46.08 g/mole

**Molecular formula** : C<sub>2</sub>H<sub>6</sub>O

**Boiling/condensation point** : 78.29°C (172.9°F)

**Date of issue/Date of revision**

: 5/18/2015.

**Date of previous issue**

: 10/28/2014.

**Version** : 0.02

5/12

## Section 9. Physical and chemical properties

|                                                     |                                                                      |
|-----------------------------------------------------|----------------------------------------------------------------------|
| <b>Melting/freezing point</b>                       | : -114°C (-173.2°F)                                                  |
| <b>Critical temperature</b>                         | : Not available.                                                     |
| <b>Odor</b>                                         | : Characteristic.                                                    |
| <b>Odor threshold</b>                               | : Not available.                                                     |
| <b>pH</b>                                           | : Not available.                                                     |
| <b>Flash point</b>                                  | : Closed cup: 9.7°C (49.5°F)                                         |
| <b>Burning time</b>                                 | : Not applicable.                                                    |
| <b>Burning rate</b>                                 | : Not applicable.                                                    |
| <b>Evaporation rate</b>                             | : 1.7 (butyl acetate = 1)                                            |
| <b>Flammability (solid, gas)</b>                    | : Not available.                                                     |
| <b>Lower and upper explosive (flammable) limits</b> | : Lower: 3.3%<br>Upper: 19%                                          |
| <b>Vapor pressure</b>                               | : 5.7 kPa (42.948650611 mm Hg) [room temperature]                    |
| <b>Vapor density</b>                                | : 1.6 (Air = 1)                                                      |
| <b>Specific Volume (ft<sup>3</sup>/lb)</b>          | : 1.2716                                                             |
| <b>Gas Density (lb/ft<sup>3</sup>)</b>              | : 0.7864 (25°C / 77 to °F)                                           |
| <b>Relative density</b>                             | : 0.8                                                                |
| <b>Solubility</b>                                   | : Not available.                                                     |
| <b>Solubility in water</b>                          | : 1000 g/l                                                           |
| <b>Partition coefficient: n-octanol/water</b>       | : -0.35                                                              |
| <b>Auto-ignition temperature</b>                    | : 455°C (851°F)                                                      |
| <b>Decomposition temperature</b>                    | : Not available.                                                     |
| <b>SADT</b>                                         | : Not available.                                                     |
| <b>Viscosity</b>                                    | : Dynamic (room temperature): 0.544 to 0.59 mPa·s (0.544 to 0.59 cP) |

## Section 10. Stability and reactivity

|                                                |                                                                                                                                                                                                                                      |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reactivity</b>                              | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| <b>Chemical stability</b>                      | : The product is stable.                                                                                                                                                                                                             |
| <b>Possibility of hazardous reactions</b>      | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| <b>Conditions to avoid</b>                     | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |
| <b>Incompatibility with various substances</b> | : Highly reactive or incompatible with the following materials: oxidizing materials and alkalis.                                                                                                                                     |
| <b>Hazardous decomposition products</b>        | : Under normal conditions of storage and use, hazardous decomposition products should not be produced.                                                                                                                               |
| <b>Hazardous polymerization</b>                | : Under normal conditions of storage and use, hazardous polymerization will not occur.                                                                                                                                               |

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Not available.

#### Irritation/Corrosion

Not available.

#### Sensitization

Not available.

#### Mutagenicity

Not available.

#### Carcinogenicity

Not available.

#### Reproductive toxicity

Not available.

#### Teratogenicity

Not available.

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

Not available.

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

Not available.

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

### Potential acute health effects

|                     |                                                     |
|---------------------|-----------------------------------------------------|
| <b>Eye contact</b>  | : No known significant effects or critical hazards. |
| <b>Inhalation</b>   | : No known significant effects or critical hazards. |
| <b>Skin contact</b> | : No known significant effects or critical hazards. |
| <b>Ingestion</b>    | : No known significant effects or critical hazards. |

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

|                     |                     |
|---------------------|---------------------|
| <b>Eye contact</b>  | : No specific data. |
| <b>Inhalation</b>   | : No specific data. |
| <b>Skin contact</b> | : No specific data. |
| <b>Ingestion</b>    | : No specific data. |

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

#### Long term exposure

## Section 11. Toxicological information

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

Not available.

### Persistence and degradability

Not available.

### Bioaccumulative potential

| Product/ingredient name | LogP <sub>ow</sub> | BCF | Potential |
|-------------------------|--------------------|-----|-----------|
| ethanol                 | -0.35              | -   | low       |

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere

**Date of issue/Date of revision** : 5/18/2015. **Date of previous issue** : 10/28/2014. **Version** : 0.02 8/12

## Section 13. Disposal considerations

inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                                   | DOT                                                                                                                                                                                                                                         | TDG                                                                                                                                                                                                                                     | Mexico                                                                                 | IMDG                                                                                     | IATA                                                                                                                                                                                            |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>UN number</b>                  | UN1170                                                                                                                                                                                                                                      | UN1170                                                                                                                                                                                                                                  | UN1170                                                                                 | UN1170                                                                                   | UN1170                                                                                                                                                                                          |
| <b>UN proper shipping name</b>    | ETHANOL OR ETHYL ALCOHOL OR ETHANOL SOLUTIONS OR ETHYL ALCOHOL SOLUTIONS                                                                                                                                                                    | ETHANOL MORE THAN 24 PER CENT ETHANOL, BY VOLUME; ETHANOL SOLUTION MORE THAN 24 PER CENT ETHANOL, BY VOLUME; ETHYL ALCOHOL MORE THAN 24 PER CENT ETHANOL, BY VOLUME; OR ETHYL ALCOHOL SOLUTION MORE THAN 24 PER CENT ETHANOL, BY VOLUME | ETHANOL OR ETHYL ALCOHOL OR ETHANOL SOLUTIONS OR ETHYL ALCOHOL SOLUTIONS               | ETHANOL (ETHYL ALCOHOL) OR ETHANOL SOLUTION (ETHYL ALCOHOL SOLUTION)                     | ETHANOL                                                                                                                                                                                         |
| <b>Transport hazard class(es)</b> | 3<br>                                                                                                                                                      | 3<br>                                                                                                                                                  | 3<br> | 3<br> | 3<br>                                                                                                        |
| <b>Packing group</b>              | II                                                                                                                                                                                                                                          | II                                                                                                                                                                                                                                      | II                                                                                     | II                                                                                       | II                                                                                                                                                                                              |
| <b>Environment</b>                | No.                                                                                                                                                                                                                                         | No.                                                                                                                                                                                                                                     | No.                                                                                    | No.                                                                                      | No.                                                                                                                                                                                             |
| <b>Additional information</b>     | <b>Limited quantity</b><br>Yes.<br><br><b>Packaging instruction</b><br><b>Passenger aircraft</b><br>Quantity limitation: 5 L<br><br><b>Cargo aircraft</b><br>Quantity limitation: 60 L<br><br><b>Special provisions</b><br>24, IB2, T4, TP1 | <b>Explosive Limit and Limited Quantity Index</b><br>5<br><br><b>Passenger Carrying Road or Rail Index</b><br>60                                                                                                                        | -                                                                                      | -                                                                                        | <b>Passenger and Cargo Aircraft</b> Quantity limitation: 5 L<br><b>Cargo Aircraft Only</b> Quantity limitation: 60 L<br><b>Limited Quantities - Passenger Aircraft</b> Quantity limitation: 1 L |

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : TSCA 8(a) CDR Exempt/Partial exemption: Not determined  
 United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

### SARA 302/304

#### Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

### SARA 311/312

Classification : Fire hazard

#### Composition/information on ingredients

| Name    | %   | Fire hazard | Sudden release of pressure | Reactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|---------|-----|-------------|----------------------------|----------|---------------------------------|---------------------------------|
| ethanol | 100 | Yes.        | No.                        | No.      | No.                             | No.                             |

### State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

### International regulations

#### International lists

: **Australia inventory (AICS)**: This material is listed or exempted.

**China inventory (IECSC)**: This material is listed or exempted.

**Japan inventory**: This material is listed or exempted.

**Korea inventory**: This material is listed or exempted.

**Malaysia Inventory (EHS Register)**: Not determined.

**New Zealand Inventory of Chemicals (NZIoC)**: This material is listed or exempted.

**Philippines inventory (PICCS)**: This material is listed or exempted.

**Taiwan inventory (CSNN)**: Not determined.

Chemical Weapons : Not listed

Convention List Schedule I Chemicals

Chemical Weapons : Not listed

Convention List Schedule II Chemicals

## Section 15. Regulatory information

**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

### Canada

**WHMIS (Canada)** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).  
**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous Material Information System (U.S.A.)

|                  |   |
|------------------|---|
| Health           | 2 |
| Flammability     | 3 |
| Physical hazards | 0 |
|                  |   |

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

**Date of printing** : 5/18/2015.  
**Date of issue/Date of revision** : 5/18/2015.  
**Date of previous issue** : 10/28/2014.  
**Version** : 0.02

## Section 16. Other information

### Key to abbreviations

: ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations  
 ACGIH – American Conference of Governmental Industrial Hygienists  
 AIHA – American Industrial Hygiene Association  
 CAS – Chemical Abstract Services  
 CEPA – Canadian Environmental Protection Act  
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)  
 CFR – United States Code of Federal Regulations  
 CPR – Controlled Products Regulations  
 DSL – Domestic Substances List  
 GWP – Global Warming Potential  
 IARC – International Agency for Research on Cancer  
 ICAO – International Civil Aviation Organisation  
 Inh – Inhalation  
 LC – Lethal concentration  
 LD – Lethal dosage  
 NDSL – Non-Domestic Substances List  
 NIOSH – National Institute for Occupational Safety and Health  
 TDG – Canadian Transportation of Dangerous Goods Act and Regulations  
 TLV – Threshold Limit Value  
 TSCA – Toxic Substances Control Act  
 WEEL – Workplace Environmental Exposure Level  
 WHMIS – Canadian Workplace Hazardous Material Information System

### References

: Not available.

 Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



# SAFETY DATA SHEET



N-Hexane

## Section 1. Identification

**GHS product identifier** : N-Hexane  
**Chemical name** : n-hexane  
**Other means of identification** : Hexane; Hexane (n-Hexane)  
**Product use** : Synthetic/Analytical chemistry.  
**Synonym** : Hexane; Hexane (n-Hexane)  
**SDS #** : 001060  
**Supplier's details** : Airgas USA, LLC and its affiliates  
259 North Radnor-Chester Road  
Suite 100  
Radnor, PA 19087-5283  
1-610-687-5253

**Emergency telephone number (with hours of operation)** : 1-866-734-3438

## Section 2. Hazards identification

**OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**Classification of the substance or mixture** : FLAMMABLE LIQUIDS - Category 2  
TOXIC TO REPRODUCTION (Fertility) - Category 2  
TOXIC TO REPRODUCTION (Unborn child) - Category 2  
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3  
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2  
AQUATIC HAZARD (LONG-TERM) - Category 2

### GHS label elements

**Hazard pictograms** :



**Signal word** : Danger

**Hazard statements** : Highly flammable liquid and vapor.  
May form explosive mixtures with air.  
Suspected of damaging fertility or the unborn child.  
May cause drowsiness and dizziness.  
May cause damage to organs through prolonged or repeated exposure.  
Toxic to aquatic life with long lasting effects.

### Precautionary statements

**General** : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Date of issue/Date of revision**

: 5/20/2015.

**Date of previous issue**

: 10/16/2014.

**Version** : 0.03

1/14

## Section 2. Hazards identification

- Precaution** : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe vapor. Wash hands thoroughly after handling.
- Response** : Collect spillage. Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
- Storage** : Store locked up. Store in a well-ventilated place. Keep cool.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : None known.

## Section 3. Composition/information on ingredients

- Substance/mixture** : Substance
- Chemical name** : n-hexane
- Other means of identification** : Hexane; Hexane (n-Hexane)

### CAS number/other identifiers

- CAS number** : 110-54-3
- Product code** : 001060

| Ingredient name | %   | CAS number |
|-----------------|-----|------------|
| n-hexane        | 100 | 110-54-3   |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention following exposure or if feeling unwell.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

## Section 4. First aid measures

- Skin contact** : Wash contaminated skin with soap and water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

### - ost important symptoms/effects, acute and delayed

#### Potential acute health effects

- Eye contact** : Causes eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach.

#### Other exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations
- Skin contact** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations
- Ingestion** : Adverse symptoms may include the following:  
reduced fetal weight  
increase in fetal deaths  
skeletal malformations

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.

## Section 4. First aid measures

- Protection of first aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Fire fighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.

- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide

- Special protective actions for fire fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flames, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

### Methods and materials for containment and cleaning up

## Section 6. Accidental release measures

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

## Section 8. Exposure controls/personal protection

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n-hexane        | <p><b>ACGIH TLV (United States, 3<sup>rd</sup> 2012).</b><br/> <b>Absorbed through skin.</b><br/> TWA: 50 ppm 8 hours.</p> <p><b>MOSH / EL (United States, 1<sup>st</sup> 2013).</b><br/> TWA: 180 mg/m<sup>3</sup> 10 hours.<br/> TWA: 50 ppm 10 hours.</p> <p><b>OSHA PEL (United States, 6<sup>th</sup> 2010).</b><br/> TWA: 1800 mg/m<sup>3</sup> 8 hours.<br/> TWA: 500 ppm 8 hours.</p> <p><b>OSHA PEL 1989 (United States, 3<sup>rd</sup> 1989).</b><br/> TWA: 180 mg/m<sup>3</sup> 8 hours.<br/> TWA: 50 ppm 8 hours.</p> |

**Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

**Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

### Skin protection

**Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**/ Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

|                                              |                                                                                                      |
|----------------------------------------------|------------------------------------------------------------------------------------------------------|
| Physical state                               | : Liquid. [COLORLESS LIQUID WITH A MILD GASOLINE-LIKE ODOR]                                          |
| Color                                        | : Colorless.                                                                                         |
| - Molecular weight                           | : 86.18 g/mole                                                                                       |
| - Molecular formula                          | : C <sub>6</sub> H <sub>14</sub>                                                                     |
| Boiling/condensation point                   | : 68.73°C (155.7°F)                                                                                  |
| - Melting/freezing point                     | : -95.35°C (-139.6°F)                                                                                |
| Critical temperature                         | : 234.25°C (453.6°F)                                                                                 |
| Odor                                         | : Characteristic.                                                                                    |
| Odor threshold                               | : Not available.                                                                                     |
| pH                                           | : Not available.                                                                                     |
| Flash point                                  | : Closed cup: -22°C (-7.6°F)                                                                         |
| Burning time                                 | : Not applicable.                                                                                    |
| Burning rate                                 | : Not applicable.                                                                                    |
| Evaporation rate                             | : 6.82 (butyl acetate = 1)                                                                           |
| Flammability (solid, gas)                    | : Extremely flammable in the presence of the following materials or conditions: oxidizing materials. |
| Lower and upper explosive (flammable) limits | : Lower: 1.1%<br>Upper: 7.5%                                                                         |
| Vapor pressure                               | : 17 kPa (127.510360216 mm Hg) [room temperature]                                                    |
| Vapor density                                | : 3 (Air = 1)                                                                                        |
| Specific Volume (ft <sup>3</sup> /lb)        | : 1.5138                                                                                             |
| Gas Density (lb/ft <sup>3</sup> )            | : 0.6606 (25°C / 77 to °F)                                                                           |
| / Relative density                           | : 0.7                                                                                                |
| Solubility                                   | : Not available.                                                                                     |
| Solubility in water                          | : 0.0098 g/l                                                                                         |
| Partition coefficient: n-octanol/water       | : 4                                                                                                  |
| Autoignition temperature                     | : 225°C (437°F)                                                                                      |
| Decomposition temperature                    | : Not available.                                                                                     |
| SADT                                         | : Not available.                                                                                     |
| Viscosity                                    | : Dynamic (room temperature): 0.3 mPa·s (0.3 cP)                                                     |

## Section 10. Stability and reactivity

|                                    |                                                                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| / Reactivity                       | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| Chemical stability                 | : The product is stable.                                                                                                                                                                                                             |
| Possibility of hazardous reactions | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| Conditions to avoid                | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |



## Section 10. Stability and reactivity

**Incompatibility with Various substances** : Extremely reactive or incompatible with the following materials: oxidizing materials.

**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/ingredient name | Result                                                     | Species           | Dose                                  | Exposure                |
|-------------------------|------------------------------------------------------------|-------------------|---------------------------------------|-------------------------|
| n-hexane                | LC50 Inhalation Gas.<br>LC50 Inhalation Vapor<br>LD50 Oral | Rat<br>Rat<br>Rat | 48000 ppm<br>96000 ppm<br>15840 mg/kg | 4 hours<br>1 hours<br>- |

#### Irritation/Corrosion

| Product/ingredient name | Result               | Species | Score | Exposure      | Observation |
|-------------------------|----------------------|---------|-------|---------------|-------------|
| n-hexane                | Eyes - Mild irritant | Rabbit  | -     | 10 milligrams | -           |

#### Sensitization

Not available.

#### Mutagenicity

Not available.

#### Carcinogenicity

Not available.

#### Reproductive toxicity

Not available.

#### Teratogenicity

Not available.

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

| Name     | Category   | Route of exposure | Target organs    |
|----------|------------|-------------------|------------------|
| n-hexane | Category 3 | Not applicable.   | Narcotic effects |

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

| Name     | Category   | Route of exposure | Target organs  |
|----------|------------|-------------------|----------------|
| n-hexane | Category 2 | Not determined    | Not determined |

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

#### Potential acute health effects

Date of issue/Date of revision : 5/20/2015. Date of previous issue : 10/16/2014. Version : 0.03 8/14



## Section 11. Toxicological information

|                     |                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Causes eye irritation.                                                                             |
| <b>Inhalation</b>   | : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.             |
| <b>Skin contact</b> | : No known significant effects or critical hazards.                                                  |
| <b>Ingestion</b>    | : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach. |

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

|                     |                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Adverse symptoms may include the following:<br>irritation<br>watering<br>redness                                                                                                                                          |
| <b>Inhalation</b>   | : Adverse symptoms may include the following:<br>nausea or vomiting<br>headache<br>drowsiness/fatigue<br>dizziness/vertigo<br>unconsciousness<br>reduced fetal weight<br>increase in fetal deaths<br>skeletal malformations |
| <b>Skin contact</b> | : Adverse symptoms may include the following:<br>reduced fetal weight<br>increase in fetal deaths<br>skeletal malformations                                                                                                 |
| <b>Ingestion</b>    | : Adverse symptoms may include the following:<br>reduced fetal weight<br>increase in fetal deaths<br>skeletal malformations                                                                                                 |

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Long term exposure

|                                    |                  |
|------------------------------------|------------------|
| <b>Potential immediate effects</b> | : Not available. |
| <b>Potential delayed effects</b>   | : Not available. |

#### Potential chronic health effects

Not available.

|                              |                                                                      |
|------------------------------|----------------------------------------------------------------------|
| <b>General</b>               | : May cause damage to organs through prolonged or repeated exposure. |
| <b>Carcinogenicity</b>       | : No known significant effects or critical hazards.                  |
| <b>- utagenicity</b>         | : No known significant effects or critical hazards.                  |
| <b>Teratogenicity</b>        | : No known significant effects or critical hazards.                  |
| <b>DeRelopmental effects</b> | : No known significant effects or critical hazards.                  |
| <b>Fertility effects</b>     | : Suspected of damaging fertility.                                   |

### Mumerical measures of toxicity

#### Acute toxicity estimates

## Section 11. Toxicological information

Not available.

## Section 12. Ecological information

### Toxicity

| Product/ingredient name | Test result                        | Species                        | Exposure |
|-------------------------|------------------------------------|--------------------------------|----------|
| n-hexane                | Acute LC50 113000 µg/l Fresh water | Fish - Oreochromis mossambicus | 96 hours |

### Persistence and degradability

Not available.

### Bioaccumulation potential

| Product/ingredient name | LogP <sub>ow</sub> | BCF     | Potential |
|-------------------------|--------------------|---------|-----------|
| n-hexane                | 4                  | 501.187 | high      |

### Volatility in soil

Soil/water partition coefficient (K<sub>oc</sub>) : Not available.

Other adverse effects : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                            | DOT                                                                                      | TDG                                                                                      | ADR 67/02                                                                                | I- DG                                                                                                                                                                            | IATA                                                                                       |
|----------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| UN number                  | UN1208                                                                                   | UN1208                                                                                   | UN1208                                                                                   | UN1208                                                                                                                                                                           | UN1208                                                                                     |
| Proper shipping name       | Hexanes                                                                                  | Hexanes                                                                                  | Hexanes                                                                                  | Hexanes                                                                                                                                                                          | Hexanes                                                                                    |
| Transport hazard class(es) | 3<br> | 3<br> | 3<br> | 3<br>  | 3<br> |

Date of issue/Date of revision : 5/20/2015. Date of previous issue : 10/16/2014. Version : 0.03 10/14

## Section 14. Transport information

| Packing group                 | II                                                                                                                                                                                                                                     | II                                                                                                                                                                          | II  | II                                                                                    | II                                                                                                       |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Environment                   | No.                                                                                                                                                                                                                                    | No.                                                                                                                                                                         | No. | Yes.                                                                                  | No.                                                                                                      |
| <b>Additional information</b> | <u>Reportable quantity</u><br>5000 lbs / 2270 kg [907.185 kg / 3436.3 L]<br>Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. | <u>Explosive Limit and Limited Quantity Index</u><br>1<br><br><u>Passenger Carrying Ship Index</u><br>Forbidden<br><br><u>Passenger Carrying / Load or / Ail Index</u><br>5 | -   | The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg. | The environmentally hazardous substance mark may appear if required by other transportation regulations. |

“Refer to CF/ 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of - A/ POL 73/8 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : TSCA 8(a) CD/ Exempt/Partial exemption: Not determined  
 United States Inventory (TSCA 8b): This material is listed or exempted.

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

**SA/ A 302/804**

**Composition information on ingredients**

No products were found.

**SA/ A 304 / Q** : Not applicable.

**SA/ A 311/812**

**Classification** : Fire hazard  
 Immediate (acute) health hazard  
 Delayed (chronic) health hazard

**Composition information on ingredients**

## Section 15. / egulatory information

| Name     | %   | Fire hazard | Sudden release of pressure | / eactiRe | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|----------|-----|-------------|----------------------------|-----------|---------------------------------|---------------------------------|
| n-hexane | 100 | Yes.        | No.                        | No.       | Yes.                            | Yes.                            |

### SA/ A 313

|                                 | Product name | CAS number | %   |
|---------------------------------|--------------|------------|-----|
| Form / N/ eporting requirements | n-hexane     | 110-54-3   | 100 |
| Supplier notification           | n-hexane     | 110-54-3   | 100 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

### State regulations

- assachusetts : This material is listed.
- Mew York : This material is listed.
- Mew Jersey : This material is listed.
- PennsylRania : This material is listed.
- Canada inRentory : This material is listed or exempted.

### International regulations

- International lists : **Australia inRentory (AICS)**: This material is listed or exempted.
- China inRentory (IECSC)**: This material is listed or exempted.
- Japan inRentory**: This material is listed or exempted.
- Korea inRentory**: This material is listed or exempted.
- alaysia inRentory (EHS / egister): Not determined.
- Mew Zealand InRentory of Chemicals (MZIoC)**: This material is listed or exempted.
- Philippines inRentory (PICCS)**: This material is listed or exempted.
- Taiwan inRentory (CSMM)**: Not determined.

Chemical Weapons : Not listed

ConRention List Schedule I Chemicals

Chemical Weapons : Not listed

ConRention List Schedule II Chemicals

Chemical Weapons : Not listed

ConRention List Schedule III Chemicals

### Canada

- WH- IS (Canada) : Class B-2: Flammable liquid
- Class D-2A: Material causing other toxic effects (Very toxic).
- Class D-2B: Material causing other toxic effects (Toxic).
- CEPA Toxic substances**: This material is not listed.
- Canadian A/ ET**: This material is not listed.
- Canadian MP/ I**: This material is listed.
- Alberta Designated Substances**: This material is not listed.
- Ontario Designated Substances**: This material is not listed.
- Quebec Designated Substances**: This material is not listed.

## Section 16. Other information

**Canada Label requirements** : Class B-2: Flammable liquid  
 Class D-2A: Material causing other toxic effects (Very toxic).  
 Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous - aterial Information System (U.S.A.)

|                  |   |   |
|------------------|---|---|
| Health           | * | 2 |
| Flammability     |   | 3 |
| Physical hazards |   | 0 |
|                  |   |   |

Caution: H- IS® ratings are based on a 0N rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although H- IS® ratings are not required on SDSs under 29 CF/ 1910.1200, the preparer may choose to provide them. H- IS® ratings are to be used with a fully implemented H- IS® program. H- IS® is a registered mark of the National Paint & Coatings Association (MPCA). H- IS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



/ eprinted with permission from MFPA 704N2001, Identification of the Hazards of - aterials for Emergency / esponse Copyright ©1997, National Fire Protection Association, Quincy, - A 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, - A 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in MFPA 49 and MFPA 325, which would be used as a guideline only. Whether the chemicals are classified by MFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

**Date of printing** : 5/20/2015.

**Date of issue/Date of revision** : 5/20/2015.

**Date of previous issue** : 10/16/2014.

**Version** : 0.03

**Key to abbreviations** : ATE = Acute Toxicity Estimate  
 BCF = Bioconcentration Factor  
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
 IATA = International Air Transport Association  
 IBC = Intermediate Bulk Container  
 IMDG = International Maritime Dangerous Goods  
 LogPow = logarithm of the octanol/water partition coefficient  
 MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
 UN = United Nations  
 ACGIH – American Conference of Governmental Industrial Hygienists  
 AIHA – American Industrial Hygiene Association  
 CAS – Chemical Abstract Services  
 CEPA – Canadian Environmental Protection Act  
 CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)

**Date of issue/Date of revision** : 5/20/2015. **Date of previous issue** : 10/16/2014. **Version** : 0.03 13/14

## Section 16. Other information

CFR – United States Code of Federal Regulations  
 CPR – Controlled Products Regulations  
 DSL – Domestic Substances List  
 GWP – Global Warming Potential  
 IARC – International Agency for Research on Cancer  
 ICAO – International Civil Aviation Organisation  
 Inh – Inhalation  
 LC – Lethal concentration  
 LD – Lethal dosage  
 NDSL – Non-Domestic Substances List  
 NIOSH – National Institute for Occupational Safety and Health  
 TDG – Canadian Transportation of Dangerous Goods Act and Regulations  
 TLV – Threshold Limit Value  
 TSCA – Toxic Substances Control Act  
 WEEL – Workplace Environmental Exposure Level  
 WHMIS – Canadian Workplace Hazardous Material Information System

### [References](#)

: Not available.

Indicates information that has changed from previously issued version.

### [Notice to reader](#)

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

# SAFETY DATA SHEET



Isopropyl Alcohol (Isopropanol)

## Section 1. Identification

|                                                             |                                                                                                                               |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>GHS product identifier</b>                               | : Isopropyl Alcohol (Isopropanol)                                                                                             |
| <b>Chemical name</b>                                        | : Isopropyl alcohol                                                                                                           |
| <b>Other means of identification</b>                        | : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol                                                                     |
| <b>Product use</b>                                          | : Synthetic/Analytical chemistry.                                                                                             |
| <b>Synonym</b>                                              | : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol                                                                     |
| <b>SDS #</b>                                                | : 001105                                                                                                                      |
| <b>Supplier's details</b>                                   | : Airgas USA, LLC and its affiliates<br>259 North Radnor-Chester Road<br>Suite 100<br>Radnor, PA 19087-5283<br>1-610-687-5253 |
| <b>Emergency telephone number (with hours of operation)</b> | : 1-866-734-3438                                                                                                              |

## Section 2. Hazards identification

|                                                   |                                                                                                                                                                         |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OSHA/NIOSH status</b>                          | : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).                                                                   |
| <b>Classification of the substance or mixture</b> | : FLAMMABLE LIQUIDS - Category 2<br>SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2<br>SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3 |

### GHS label elements

**Hazard pictograms**



**Signal word**

: Danger

**Hazard statements**

: Highly flammable liquid and vapor.  
May form explosive mixtures with air.  
Causes serious eye irritation.  
May cause drowsiness and dizziness.

### Precautionary statements

**General**

: Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

**Prevention**

: Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling. Use and store only outdoors or in a well ventilated place.

**Date of issue/Date of revision**

: 5/20/2015.

**Date of previous issue**

: 10/28/2014.

**Version** : 0.02

1/14

## Section 2. Hazards identification

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>/ response</b>                       | : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. |
| <b>Storage</b>                          | : Store locked up. Store in a well-ventilated place. Keep cool.                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Disposal</b>                         | : Dispose of contents and container in accordance with all local, regional, national and international regulations.                                                                                                                                                                                                                                                                                                                                 |
| <b>Hazards not otherwise classified</b> | : None known.                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Section 3. Composition and information on ingredients

|                                      |                                                           |
|--------------------------------------|-----------------------------------------------------------|
| <b>Substance/mixture</b>             | : Substance                                               |
| <b>Chemical name</b>                 | : Isopropyl alcohol                                       |
| <b>Other means of identification</b> | : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol |

### CAS number and other identifiers

|                     |           |
|---------------------|-----------|
| <b>CAS number</b>   | : 67-63-0 |
| <b>Product code</b> | : 001105  |

| Ingredient name | %   | CAS number |
|-----------------|-----|------------|
| propan-2-ol     | 100 | 67-63-0    |

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

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

## Section 4. First aid measures

### Description of necessary first aid measures

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Eye contact</b>  | : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Inhalation</b>   | : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |
| <b>Skin contact</b> | : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ingestion</b>    | : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention.                   |



## Section 4. First aid measures

immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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

#### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

#### Overexposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

- otes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

## Section 5. Firefighting measures

### Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO<sub>2</sub>, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

## Section 5. Firefighting measures

- Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide
- Special protective actions for firefighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for firefighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

## Section 7. Handling and storage

### Advice on general occupational hygiene

- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

### Conditions for safe storage, including any incompatibilities

- : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controlsPersonal protection

### Control parameters

#### Occupational exposure limits

| Ingredient name | Exposure limits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| propan-2-ol     | <p><b>ACGIH TLV (United States, 3<del>R</del>012).</b><br/> TWA: 200 ppm 8 hours.<br/> STEL: 400 ppm 15 minutes.</p> <p><b>OSHA PEL 1989 (United States, 3<del>R</del>989).</b><br/> TWA: 400 ppm 8 hours.<br/> TWA: 980 mg/m<sup>3</sup> 8 hours.<br/> STEL: 500 ppm 15 minutes.<br/> STEL: 1225 mg/m<sup>3</sup> 15 minutes.</p> <p><b>- IOSH / EL (United States, 1<del>R</del>013).</b><br/> TWA: 400 ppm 10 hours.<br/> TWA: 980 mg/m<sup>3</sup> 10 hours.<br/> STEL: 500 ppm 15 minutes.<br/> STEL: 1225 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL (United States, 6<del>R</del>010).</b><br/> TWA: 400 ppm 8 hours.<br/> TWA: 980 mg/m<sup>3</sup> 8 hours.</p> |

### Appropriate engineering controls

- : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

### Environmental exposure controls

- : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

#### Hygiene measures

- : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

## Section 8. Exposure controlsPersonal protection

- Eye/Face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- / Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid. [COLORLESS LIQUID WITH THE ODOR OF RUBBING ALCOHOL]
- Color** : Colorless.
- Molecular weight** : 60.11 g/mole
- Molecular formula** : C<sub>3</sub>H<sub>8</sub>O
- Boiling/Condensation point** : 83°C (181.4°F)
- Melting/Freezing point** : -90°C (-130°F)
- Critical temperature** : Not available.
- Odor** : Alcohol-like.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Closed cup: 11.7°C (53.1°F)
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : 1.7 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 2%  
Upper: 12%
- Vapor pressure** : 4.4 kPa (33.002681467 mm Hg) [room temperature]
- Vapor density** : 2.1 (Air = 1)
- Specific Volume (ft<sup>3</sup>/lb)** : 1.2739
- Gas Density (lb/ft<sup>3</sup>)** : 0.785
- / Relative density** : 0.79

## Section 9. Physical and chemical properties

|                                                |                   |
|------------------------------------------------|-------------------|
| <b>Solubility</b>                              | : Not available.  |
| <b>Solubility in water</b>                     | : Not available.  |
| <b>Partition coefficient: nM octanol/water</b> | : 0.05            |
| <b>Autoignition temperature</b>                | : 456°C (852.8°F) |
| <b>Decomposition temperature</b>               | : Not available.  |
| <b>SADT</b>                                    | : Not available.  |
| <b>Viscosity</b>                               | : Not available.  |

## Section 10. Stability and reactivity

|                                                |                                                                                                                                                                                                                                      |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reactivity</b>                              | : No specific test data related to reactivity available for this product or its ingredients.                                                                                                                                         |
| <b>Chemical stability</b>                      | : The product is stable.                                                                                                                                                                                                             |
| <b>Possibility of hazardous reactions</b>      | : Under normal conditions of storage and use, hazardous reactions will not occur.                                                                                                                                                    |
| <b>Conditions to avoid</b>                     | : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas. |
| <b>Incompatibility with various substances</b> | : Highly reactive or incompatible with the following materials: acids and moisture.                                                                                                                                                  |
| <b>Hazardous decomposition products</b>        | : Under normal conditions of storage and use, hazardous decomposition products should not be produced.                                                                                                                               |
| <b>Hazardous polymerization</b>                | : Under normal conditions of storage and use, hazardous polymerization will not occur.                                                                                                                                               |

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

| Product/Ingredient name | Result                                           | Species              | Dose                                   | Exposure          |
|-------------------------|--------------------------------------------------|----------------------|----------------------------------------|-------------------|
| propan-2-ol             | LC50 Inhalation Gas.<br>LD50 Dermal<br>LD50 Oral | Rat<br>Rabbit<br>Rat | 45248 ppm<br>12800 mg/kg<br>5000 mg/kg | 1 hours<br>-<br>- |

#### Irritation/Corrosion

| Product/Ingredient name | Result                   | Species | Score | Exposure                | Observation |
|-------------------------|--------------------------|---------|-------|-------------------------|-------------|
| propan-2-ol             | Eyes - Moderate irritant | Rabbit  | -     | 24 hours 100 milligrams | -           |
|                         | Eyes - Moderate irritant | Rabbit  | -     | 10 milligrams           | -           |
|                         | Eyes - Severe irritant   | Rabbit  | -     | 100 milligrams          | -           |
|                         | Skin - Mild irritant     | Rabbit  | -     | 500 milligrams          | -           |

#### Sensitization

Not available.

## Section 11. Toxicological information

### Nutagenicity

Not available.

### Carcinogenicity

Not available.

### Classification

| Product name | Ingredient name | OSHA | IA/ C | - TP |
|--------------|-----------------|------|-------|------|
|              | propan-2-ol     | -    | 3     | -    |

### / eproductive toxicity

Not available.

### Teratogenicity

Not available.

### Specific target organ toxicity (single exposure)

| - ame       | Category   | / oute of exposure | Target organs    |
|-------------|------------|--------------------|------------------|
| propan-2-ol | Category 3 | Not applicable.    | Narcotic effects |

### Specific target organ toxicity (repeated exposure)

Not available.

### Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Can cause central nervous system (CNS) depression. Irritating to mouth, throat and stomach.

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

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
nausea or vomiting  
headache  
drowsiness/fatigue  
dizziness/vertigo  
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

### Delayed and immediate effects and also chronic effects from short and long term exposure

Date of issue/Date of revision : 5/20/2015. Date of previous issue : 10/28/2014. Version : 0.02 8/14

## Section 11. Toxicological information

### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

### - Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

| Product/Ingredient name | Result                                             | Species                       | Exposure |
|-------------------------|----------------------------------------------------|-------------------------------|----------|
| propan-2-ol             | Acute LC50 1400000 to 1950000 µg/l<br>Marine water | Crustaceans - Crangon crangon | 48 hours |
|                         | Acute LC50 4200 mg/l Fresh water                   | Fish - Rasbora heteromorpha   | 96 hours |

### Persistence and degradability

Not available.

### Bioaccumulative potential

| Product/Ingredient name | LogP <sub>ow</sub> | BCF | Potential |
|-------------------------|--------------------|-----|-----------|
| propan-2-ol             | 0.05               | -   | low       |

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

|                                   | DOT                                                                                                                                                                                                                                     | TDG                                                                                                                | Nexico                                                                                 | INDG                                                                                     | IATA                                                                                                                                                                                                            |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>U- number</b>                  | UN1219                                                                                                                                                                                                                                  | UN1219                                                                                                             | UN1219                                                                                 | UN1219                                                                                   | UN1219                                                                                                                                                                                                          |
| <b>U- proper shipping name</b>    | ISOPROPANOL OR ISOPROPYL ALCOHOL                                                                                                                                                                                                        | ISOPROPANOL; OR ISOPROPYL ALCOHOL                                                                                  | ISOPROPANOL OR ISOPROPYL ALCOHOL                                                       | ISOPROPANOL (ISOPROPYL ALCOHOL)                                                          | ISOPROPANOL                                                                                                                                                                                                     |
| <b>Transport hazard class(es)</b> | 3<br>                                                                                                                                                  | 3<br>                             | 3<br> | 3<br> | 3<br>                                                                                                                        |
| <b>Packing group</b>              | II                                                                                                                                                                                                                                      | II                                                                                                                 | II                                                                                     | II                                                                                       | II                                                                                                                                                                                                              |
| <b>Environment</b>                | No.                                                                                                                                                                                                                                     | No.                                                                                                                | No.                                                                                    | No.                                                                                      | No.                                                                                                                                                                                                             |
| <b>Additional information</b>     | <u>Limited quantity</u><br>Yes.<br><br><u>Packaging instruction</u><br><b>Passenger aircraft</b><br>Quantity limitation: 5 L<br><br><b>Cargo aircraft</b><br>Quantity limitation: 60 L<br><br><u>Special provisions</u><br>IB2, T4, TP1 | <u>Explosive Limit and Limited Quantity Index</u><br>1<br><br><u>Passenger Carrying / load or / ail Index</u><br>5 | -                                                                                      | -                                                                                        | <u>Passenger and Cargo Aircraft</u> Quantity limitation: 5 L<br><u>Cargo Aircraft Only</u><br>Quantity limitation: 60 L<br><u>Limited Quantities M</u><br><u>Passenger Aircraft</u><br>Quantity limitation: 1 L |

“/ efer to CF/ 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of NA/ POL 73R8 and the IBC Code** : Not available.



## Section 15. / egulatory information

**U.S. Federal regulations** : TSCA 8(a) CD/ Exempt~~Partial~~ exemption: Not determined  
**United States inventory (TSCA 8b)**: This material is listed or exempted.

**Clean Air Act Section 112** : Not listed  
**(b) Hazardous Air Pollutants (HAPs)**

**Clean Air Act Section 602** : Not listed  
**Class I Substances**

**Clean Air Act Section 602** : Not listed  
**Class II Substances**

**DEA List I Chemicals** : Not listed  
**(Precursor Chemicals)**

**DEA List II Chemicals** : Not listed  
**(Essential Chemicals)**

### SA/ A 302~~304~~

#### Composition~~Information~~ on ingredients

No products were found.

**SA/ A 304 / Q** : Not applicable.

### SA/ A 311~~312~~

**Classification** : Fire hazard  
 Immediate (acute) health hazard

#### Composition~~Information~~ on ingredients

| - ame       | %   | Fire hazard | Sudden release of pressure | / eactive | Immediate (acute) health hazard | Delayed (chronic) health hazard |
|-------------|-----|-------------|----------------------------|-----------|---------------------------------|---------------------------------|
| propan-2-ol | 100 | Yes.        | No.                        | No.       | Yes.                            | No.                             |

### SA/ A 313

|                                       | Product name      | CAS number | %   |
|---------------------------------------|-------------------|------------|-----|
| <b>Form / M eporting requirements</b> | Isopropyl alcohol | 67-63-0    | 100 |
| <b>Supplier notification</b>          | Isopropyl alcohol | 67-63-0    | 100 |

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

### State regulations

**Nassachusetts** : This material is listed.

**- ew York** : This material is not listed.

**- ew Jersey** : This material is listed.

**Pennsylvania** : This material is listed.

**Canada inventory** : This material is listed or exempted.

### International regulations

## Section 15. / egulatory information

**International lists**

- : **Australia inventory (AICS)**: This material is listed or exempted.
- : **China inventory (IECSC)**: This material is listed or exempted.
- : **Japan inventory**: This material is listed or exempted.
- : **Korea inventory**: This material is listed or exempted.
- : **Nalaysia Inventory (EHS / egister)**: Not determined.
- : **- ew Zealand Inventory of Chemicals (- ZloC)**: This material is listed or exempted.
- : **Philippines inventory (PICCS)**: This material is listed or exempted.
- : **Taiwan inventory (CS- - )**: Not determined.

**Chemical Weapons Convention List Schedule I Chemicals**

: Not listed

**Chemical Weapons Convention List Schedule II Chemicals**

: Not listed

**Chemical Weapons Convention List Schedule III Chemicals**

: Not listed

### Canada

**WHNIS (Canada)**

- : Class B-2: Flammable liquid
- : Class D-2B: Material causing other toxic effects (Toxic).
- : **CEPA Toxic substances**: This material is not listed.
- : **Canadian A/ ET**: This material is not listed.
- : **Canadian - P/ I**: This material is listed.
- : **Alberta Designated Substances**: This material is not listed.
- : **Ontario Designated Substances**: This material is not listed.
- : **Quebec Designated Substances**: This material is not listed.

## Section 16. Other information

**Canada Label requirements**

- : Class B-2: Flammable liquid
- : Class D-2B: Material causing other toxic effects (Toxic).

### Hazardous Nateral Information System (U.S.A.)

|                  |   |   |
|------------------|---|---|
| Health           | * | 2 |
| Flammability     |   | 3 |
| Physical hazards |   | 0 |
|                  |   |   |

Caution: HNIS® ratings are based on a 0M rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HNIS® ratings are not required on SDSs under 29 CF/ 1910. 1200, the preparer may choose to provide them. HNIS® ratings are to be used with a fully implemented HNIS® program. HNIS® is a registered mark of the - ational Paint & Coatings Association (- PCA). HNIS® materials may be purchased exclusively from J. J. Keller (800) 327M868.

The customer is responsible for determining the PPE code for this material.

### - ational Fire Protection Association (U.S.A.)



## Section 16. Other information

/ eprinted with permission from - FPA 704M2001, Identification of the Hazards of N aterials for Emergency  
 / esponse Copyright ©1997, - ational Fire Protection Association, Quincy, NA 02269. This reprinted material is  
 not the complete and official position of the - ational Fire Protection Association, on the referenced subject  
 which is represented only by the standard in its entirety.

Copyright ©2001, - ational Fire Protection Association, Quincy, NA 02269. This warning system is intended to  
 be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of  
 chemicals. The user is referred to certain limited number of chemicals with recommended classifications in  
 - FPA 49 and - FPA 325, which would be used as a guideline only. Whether the chemicals are classified by - FPA  
 or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### History

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of printing       | : 5/20/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Date of issue          | : 5/20/2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Date of revision       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Date of previous issue | : 10/28/2014.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Version                | : 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Key to abbreviations   | : ATE = Acute Toxicity Estimate<br>BCF = Bioconcentration Factor<br>GHS = Globally Harmonized System of Classification and Labelling of Chemicals<br>IATA = International Air Transport Association<br>IBC = Intermediate Bulk Container<br>IMDG = International Maritime Dangerous Goods<br>LogPow = logarithm of the octanol/water partition coefficient<br>MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships,<br>1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)<br>UN = United Nations<br>ACGIH – American Conference of Governmental Industrial<br>Hygienists<br>AIHA – American Industrial Hygiene Association<br>CAS – Chemical Abstract Services<br>CEPA – Canadian Environmental Protection Act<br>CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act<br>(EPA)<br>CFR – United States Code of Federal Regulations<br>CPR – Controlled Products Regulations<br>DSL – Domestic Substances List<br>GWP – Global Warming Potential<br>IARC – International Agency for Research on Cancer<br>ICAO – International Civil Aviation Organisation<br>Inh – Inhalation<br>LC – Lethal concentration<br>LD – Lethal dosage<br>NDSL – Non-Domestic Substances List<br>NIOSH – National Institute for Occupational Safety and Health<br>TDG – Canadian Transportation of Dangerous Goods Act and Regulations<br>TLV – Threshold Limit Value<br>TSCA – Toxic Substances Control Act<br>WEEL – Workplace Environmental Exposure Level<br>WHMIS – Canadian Workplace Hazardous Material Information System |

/ eferences : Not available.

Indicates information that has changed from previously issued version.

- otice to reader

## Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

**Appendix C**

**Health and Safety Plan Acceptance and  
Training Acknowledgement**

Instructions: This form is to be completed by each person that works on this project at the Subject Property and returned to the Site Safety and Health Officer.

I have read and agree to abide by the contents of the SITE-SPECIFIC HEALTH AND SAFETY PLAN for work activities at the site. I have completed the training requirements specified in the plan. I am currently participating in a medical surveillance program that satisfies the requirements of CFR 1910.120.

Signature:

---

---

---

---

---

---

---

---

---

---

Date:

---

---

---

---

---

---

---

---

---

---

Return to:

Site Safety and Health Officer at  
Preferred Environmental Services  
323 Merrick Avenue  
North Merrick, New York 11566

---

**Appendix D**

**Report of Accident/Injury Form**

**PREFERRED ENVIRONMENTAL SERVICES**  
323 Merrick Avenue, North Merrick, New York 11566

**Accident / Injury Report Form**

Name: \_\_\_\_\_ Sex: ☐ Male ☐ Female  
Address: \_\_\_\_\_  
Street City State Zip Code  
Telephone: \_\_\_\_\_ E-Mail: \_\_\_\_\_ Social Security Number: \_\_\_\_\_

Date of This Report: \_\_\_\_\_ Date of Accident: \_\_\_\_\_  
Time of Accident: \_\_\_\_\_ a.m. / p.m. Place of Accident: \_\_\_\_\_

**NATURE OF INJURY**

|             |       |             |       |
|-------------|-------|-------------|-------|
| Abrasion    | _____ | Fracture    | _____ |
| Aspxiation  | _____ | Laceration  | _____ |
| Bite        | _____ | Poisoning   | _____ |
| Bruise      | _____ | Puncture    | _____ |
| Burn        | _____ | Scalds      | _____ |
| Concussion  | _____ | Scratches   | _____ |
| Cut         | _____ | Shock (el.) | _____ |
| Dislocation | _____ | Sprain      | _____ |

Other (specify) \_\_\_\_\_

**DESCRIPTION OF ACCIDENT**

**PART OF BODY INJURED**

|         |       |       |                                                             |
|---------|-------|-------|-------------------------------------------------------------|
| Abdoman | _____ | Ankle | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Back    | _____ | Arm   | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Chest   | _____ | Ear   | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Face    | _____ | Elbow | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Finger  | _____ | Eye   | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Head    | _____ | Foot  | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Mouth   | _____ | Hand  | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Nose    | _____ | Knee  | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Scalp   | _____ | Leg   | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |
| Tooth   | _____ | Wrist | ( <input type="checkbox"/> R / <input type="checkbox"/> L ) |

Other ( specify ) \_\_\_\_\_

How did accident happen? What was the person doing? Where was the person? List any specifically unsafe acts and unsafe conditions existing? Specify any tool, machine or equipment involved? Additional space available on back

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IMMEDIATE ACTION TAKEN**

First Aid Treatment Given: ☐ YES ☐ NO By Name: \_\_\_\_\_ Phone #: \_\_\_\_\_ Email: \_\_\_\_\_

First Aid Rendered: \_\_\_\_\_

Contact 911 ☐ YES ☐ NO By Name: \_\_\_\_\_ Phone #: \_\_\_\_\_ Email: \_\_\_\_\_

Referred to Health Services? ☐ YES ☐ NO Sent to Hospital? ☐ YES ☐ NO

Transported to health care facility for further examination/treatment ? ☐ YES ☐ NO

☐ Ambulance ☐ Personal Vehicle ☐ Friends Vehicle (name) \_\_\_\_\_

|                   |                   |
|-------------------|-------------------|
| 1. Witness: _____ | 2. Witness: _____ |
| Address: _____    | Address: _____    |
| Phone #: _____    | Phone #: _____    |
| E-Mail: _____     | E-Mail: _____     |

Date: \_\_\_\_\_ Acknowledgement of Injured Party: \_\_\_\_\_

Form Submitted by: \_\_\_\_\_ Signature & Date: \_\_\_\_\_

**Please attach additional comments / information on back of sheet**





GZA GeoEnvironmental of New York.



## **APPENDIX C – COMMUNITY AIR MONITORING PLAN (CAMP)**



Known for excellence.  
Built on trust.

GEOTECHNICAL  
ENVIRONMENTAL  
ECOLOGICAL  
WATER  
CONSTRUCTION  
MANAGEMENT

GZA GeoEnvironmental of  
New York  
104 West 29th Street  
10th Floor  
New York, NY 10001  
T: 212.594.8140  
F: 212.279.8180  
www.gza.com



## Appendix E

### New York State Department of Health

### Generic Community Air Monitoring Plan

### Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

### Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require



particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

**Continuous monitoring** will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

**Periodic monitoring** for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. A periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

### **VOC Monitoring, Response Levels, and Actions**

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

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the



source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

### **Particulate Monitoring, Response Levels, and Actions**

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter ( $\text{mcg}/\text{m}^3$ ) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150  $\text{mcg}/\text{m}^3$  above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150  $\text{mcg}/\text{m}^3$  above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150  $\text{mcg}/\text{m}^3$  of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.



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

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

1. If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
2. If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m<sup>3</sup>, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m<sup>3</sup> or less at the monitoring point.
3. Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

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

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



June 2024

BCP Site No. 2244390C

41.0163279.00

19-27 Clay Street and 60-62 Commercial Street, Brooklyn, NY

Page | 5

activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.



## **APPENDIX D – HISTORICAL DATA TABLES (MARCH 2023 AND MAY 2023)**



| Table 1<br>Summary of Samples Collected and Analytical Suites |                                            |                        |                                 |                                       |                                                                                      |
|---------------------------------------------------------------|--------------------------------------------|------------------------|---------------------------------|---------------------------------------|--------------------------------------------------------------------------------------|
| Sample ID                                                     | Sample Interval<br>(and/or Depth to Water) | Sample Collection Date | Associated Soil Boring Location | Property Location                     | Analytical Suite                                                                     |
| Soil Samples                                                  |                                            |                        |                                 |                                       |                                                                                      |
| SB-1 (0-2 ft bgs)                                             | 0- 2 +/- ft bgs                            | 2/10/2023              | SB-1                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-1 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-1                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-2 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/10/2023              | SB-2                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-2 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-2                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-3 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/10/2023              | SB-3                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-3 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-3                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-4 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/10/2023              | SB-4                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved), PFAS, 1,4 Dioxane |
| SB-4 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-4                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved), PFAS, 1,4 Dioxane |
| SB-5 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/10/2023              | SB-5                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-5 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-5                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-6 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/10/2023              | SB-6                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-6 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-6                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved), PFAS, 1,4 Dioxane |
| SB-7 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/10/2023              | SB-7                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-7 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/10/2023              | SB-7                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-8 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/13/2023              | SB-8                            | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-8 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/13/2023              | SB-8                            | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-X (Duplicate of SB-8 (4-6 ft))                             | 4-6 +/- ft bgs                             | 2/13/2023              | SB-8                            | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-9 (0-2 ft bgs)                                             | 0-2 +/- ft bgs                             | 2/13/2023              | SB-9                            | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-9 (4-6 ft bgs)                                             | 4-6 +/- ft bgs                             | 2/13/2023              | SB-9                            | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-10 (0-2 ft bgs)                                            | 0-2 +/- ft bgs                             | 2/13/2023              | SB-10                           | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| SB-10 (4-6 ft bgs)                                            | 4-6 +/- ft bgs                             | 2/13/2023              | SB-10                           | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| MS/MSD - SB-10 (4-6 ft bgs)                                   | 4-6 +/- ft bgs                             | 2/13/2023              | SB-10                           | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (dissolved/undissolved)                    |
| Soil Vapor Samples                                            |                                            |                        |                                 |                                       |                                                                                      |
| SV-1                                                          | 5 +/- in bgs                               | 2/14/2023              | North of SB-2                   | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| SV-2                                                          | 5 +/- in bgs                               | 2/14/2023              | Adjacent to SB-3                | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| SV-3                                                          | 5 +/- ft bgs                               | 2/14/2023              | In SB-4                         | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| SV-4                                                          | 5 +/- ft bgs                               | 2/14/2023              | North of SB-4                   | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| SV-5                                                          | 5 +/- ft bgs                               | 2/14/2023              | In SB-6                         | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| SV-6                                                          | 5 +/- ft bgs                               | 2/14/2023              | Adjacent to SB-7                | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| SV-7                                                          | 5 +/- ft bgs                               | 2/14/2023              | Adjacent to SB-8                | 60-62 Commercial Street, Brooklyn, NY | TO-15                                                                                |
| SV-8                                                          | 5 +/- ft bgs                               | 2/14/2023              | Adjacent to SB-9                | 60-62 Commercial Street, Brooklyn, NY | TO-15                                                                                |
| SV-9                                                          | 5 +/- ft bgs                               | 2/14/2023              | Adjacent to SB-10               | 60-62 Commercial Street, Brooklyn, NY | TO-15                                                                                |
| OA-1                                                          | 4-5 +/- ft ags                             | 2/14/2023              | SB-2                            | 29 Clay Street, Brooklyn, NY          | TO-15                                                                                |
| OA-2                                                          | 4-5 +/- ft ags                             | 2/14/2023              | SB-8                            | 60-62 Commercial Street, Brooklyn, NY | TO-15                                                                                |
| Groundwater Samples                                           |                                            |                        |                                 |                                       |                                                                                      |
| GW-1                                                          | 15 +/- ft bgs                              | 2/14/2023              | SB-1                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |
| MS/MSD - GW-1                                                 | 15 +/- ft bgs                              | 2/14/2023              | SB-1                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |
| GW-2                                                          | 15 +/- ft bgs                              | 2/14/2023              | SB-7                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |
| GW- X (Duplicate of GW-3)                                     | 15 +/- ft bgs                              | 2/14/2023              | SB-3                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |
| GW-3                                                          | 15 +/- ft bgs                              | 2/14/2023              | SB-3                            | 29 Clay Street, Brooklyn, NY          | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |
| GW-4                                                          | 15 +/- ft bgs                              | 2/13/2023              | SB-9                            | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |
| GW-5                                                          | 15 +/- ft bgs                              | 2/13/2023              | SB-10                           | 60-62 Commercial Street, Brooklyn, NY | VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total and Dissolved), PFAS, 1,4 Dioxane   |

ft bgs- Feet Below Grade Surface

ft ags- Feet Above Grade Surface

| Table 2<br>Volatile Organic Compounds in Soil Samples<br>Clay Street, Brooklyn NY |       |        |                      |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                 |   |
|-----------------------------------------------------------------------------------|-------|--------|----------------------|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|-----------------|---|
| Sample ID                                                                         | UUSCO | RRUSCO | Protectio<br>n of GW | SB-1 (0-2)<br>2380662-01<br>Soil |   | SB-1 (4-6)<br>2380662-02<br>Soil |   | SB-2 (0-2)<br>2380662-03<br>Soil |   | SB-2 (4-6)<br>2380662-04<br>Soil |   | SB-3 (0-2)<br>2380662-13<br>Soil |   | SB-3 (4-6)<br>2380662-14<br>Soil |   | SB-4 (0-2)<br>2380662-11<br>Soil |   | SB-4 (4-6)<br>2380662-12<br>Soil |   | SB-5 (0-2)<br>2380662-09<br>Soil |   | SB-5 (4-6)<br>2380662-10<br>Soil |   | SB-6 (0-2)<br>2380662-05<br>Soil |   | SB-6 (4-6)<br>2380662-06<br>Soil |   | SB-7 (0-2)<br>2380662-07<br>Soil |   | SB-7 (4-6)<br>2380662-08<br>Soil |   |                 |   |
| Client Matrix                                                                     | mg/Kg | mg/Kg  | mg/Kg                | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg                  | Q | Result<br>mg/Kg | Q |
| VOA, 8260 MASTER                                                                  |       |        |                      |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                 |   |
| Dilution Factor                                                                   |       |        |                      |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                 |   |
| 1,1,1,2-Tetrachloroethane                                                         | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1,1-Trichloroethane                                                             | 0.68  | 100    | 0.68                 | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00350                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1,2,2-Tetrachloroethane                                                         | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon                                      | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1,2-Trichloroethane                                                             | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1-Dichloroethane                                                                | 0.27  | 26     | 0.27                 | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1-Dichloroethylene                                                              | 0.33  | 100    | 0.33                 | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,1-Dichloropropylene                                                             | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2,3-Trichlorobenzene                                                            | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2,3-Trichloropropane                                                            | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2,4,5-Tetramethylbenzene                                                        | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2,4-Trichlorobenzene                                                            | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2,4-Trimethylbenzene                                                            | 3.6   | 52     | 3.6                  | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2-Dibromo-3-chloropropane                                                       | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2-Dibromoethane                                                                 | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2-Dichlorobenzene                                                               | 1.1   | 100    | 1.1                  | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2-Dichloroethane                                                                | 0.02  | 3.1    | 0.02                 | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,2-Dichloropropane                                                               | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,3,5-Trimethylbenzene                                                            | 8.4   | 52     | 8.4                  | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,3-Dichlorobenzene                                                               | 2.4   | 49     | 2.4                  | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,3-Dichloropropane                                                               | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,4-Dichlorobenzene                                                               | 1.8   | 13     | 1.8                  | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 1,4-Dioxane                                                                       | 0.1   | 13     | 0.1                  | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 2,2-Dichloropropane                                                               | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 2-Butanone                                                                        | 0.12  | 100    | 0.12                 | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 2-Chloroethylvinyl ether                                                          | ~     | ~      | ~                    | 0.0140                           | U | 0.00940                          | U | 0.0120                           | U | 0.00880                          | U | 0.00900                          | U | 0.00950                          | U | 0.0100                           | U | 0.00950                          | U | 0.0120                           | U | 0.00890                          | U | 0.0140                           | U | 0.0100                           | U | 0.0120                           | U | 0.00860                          | U | 0.00860         | U |
| 2-Chlorotoluene                                                                   | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 2-Hexanone                                                                        | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 4-Chlorotoluene                                                                   | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| 4-Methyl-2-pentanone                                                              | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| Acetone                                                                           | 0.05  | 100    | 0.05                 | 0.00700                          | U | 0.00470                          | U | 0.00610                          | U | 0.00440                          | U | 0.00450                          | U | 0.00470                          | U | 0.00510                          | U | 0.00460                          | J | 0.00600                          | U | 0.00440                          | U | 0.00710                          | U | 0.0200                           | U | 0.0110                           | J | 0.00430                          | U | 0.00430         | U |
| Acrolein                                                                          | ~     | ~      | ~                    | 0.00700                          | U | 0.00470                          | U | 0.00610                          | U | 0.00440                          | U | 0.00450                          | U | 0.00470                          | U | 0.00510                          | U | 0.00470                          | U | 0.00600                          | U | 0.00440                          | U | 0.00710                          | U | 0.00520                          | U | 0.00610                          | U | 0.00430                          | U | 0.00430         | U |
| Acrylonitrile                                                                     | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| Benzene                                                                           | 0.06  | 4.8    | 0.06                 | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| Bromobenzene                                                                      | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.00220                          | U | 0.00220         | U |
| Bromochloromethane                                                                | ~     | ~      | ~                    | 0.00350                          | U | 0.00230                          | U | 0.00310                          | U | 0.00220                          | U | 0.00230                          | U | 0.00240                          | U | 0.00260                          | U | 0.00240                          | U | 0.00300                          | U | 0.00220                          | U | 0.00350                          | U | 0.00260                          | U | 0.00310                          | U | 0.0                              |   |                 |   |

| Table 3<br>Semi-Volatile Organic Compounds In Soil Samples<br>Clay Street, Brooklyn NY |       |        |                     |                                  |   |                                  |   |                                  |    |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |   |                                  |            |                                  |   |                                  |    |                                  |   |            |  |
|----------------------------------------------------------------------------------------|-------|--------|---------------------|----------------------------------|---|----------------------------------|---|----------------------------------|----|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|------------|----------------------------------|---|----------------------------------|----|----------------------------------|---|------------|--|
| Sample ID<br>York ID<br>Client Matrix                                                  | UUSCO | RRUSCO | Protection of<br>GW | SB-1 (0-2)<br>23B0662-01<br>Soil |   | SB-1 (4-6)<br>23B0662-02<br>Soil |   | SB-2 (0-2)<br>23B0662-03<br>Soil |    | SB-2 (4-6)<br>23B0662-04<br>Soil |   | SB-3 (0-2)<br>23B0662-13<br>Soil |   | SB-3 (4-6)<br>23B0662-14<br>Soil |   | SB-4 (0-2)<br>23B0662-11<br>Soil |   | SB-4 (4-6)<br>23B0662-12<br>Soil |   | SB-5 (0-2)<br>23B0662-09<br>Soil |   | SB-5 (4-6)<br>23B0662-10<br>Soil |   | SB-6 (0-2)<br>23B0662-05<br>Soil |            | SB-6 (4-6)<br>23B0662-06<br>Soil |   | SB-7 (0-2)<br>23B0662-07<br>Soil |    | SB-7 (4-6)<br>23B0662-08<br>Soil |   |            |  |
| Compound                                                                               |       |        |                     | Result                           | Q | Result                           | Q | Result                           | Q  | Result                           | Q | Result                           | Q | Result                           | Q | Result                           | Q | Result                           | Q | Result                           | Q | Result                           | Q | Result                           | Q          | Result                           | Q | Result                           | Q  | Result                           | Q |            |  |
| Semi-Volatiles, 1,4-Dioxane 8270 SIM-5<br>Dilution Factor                              | mg/Kg | mg/Kg  | mg/Kg               |                                  |   |                                  |   |                                  |    |                                  |   |                                  |   |                                  |   | mg/Kg<br>1                       |   |                                  |   |                                  |   |                                  |   |                                  | mg/Kg<br>1 |                                  |   |                                  |    |                                  |   |            |  |
| 1,4-Dioxane                                                                            | 0.1   | 13     | 0.1                 | NT                               |   | NT                               |   | NT                               |    | NT                               |   | NT                               |   | NT                               |   | 0.0194                           | U | NT                               |   | NT                               |   | NT                               |   | NT                               |            | 0.0194                           | U | NT                               |    | NT                               |   | NT         |  |
| SVOA, 8270 MASTER<br>Dilution Factor                                                   | mg/Kg | mg/Kg  | mg/Kg               | mg/Kg<br>2                       |   | mg/Kg<br>2                       |   | mg/Kg<br>2                       |    | mg/Kg<br>2                       |   | mg/Kg<br>2                       |   | mg/Kg<br>2                       |   | mg/Kg<br>2                       |   | mg/Kg<br>10                      |   | mg/Kg<br>2                       |   | mg/Kg<br>2                       |   | mg/Kg<br>2                       |            | mg/Kg<br>2                       |   | mg/Kg<br>20                      |    | mg/Kg<br>2                       |   | mg/Kg<br>2 |  |
| 1,1-Biphenyl                                                                           | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.121                            | D | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0681                           | JD | 0.0512                           | U |            |  |
| 1,2,4,5-Tetrachlorobenzene                                                             | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 1,2,4-Trichlorobenzene                                                                 | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 1,2-Dichlorobenzene                                                                    | 1.1   | 100    | 1.1                 | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 1,2-Diphenylhydrazine (as Azobenzene)                                                  | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 1,3-Dichlorobenzene                                                                    | 2.4   | 49     | 2.4                 | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 1,4-Dichlorobenzene                                                                    | 1.8   | 13     | 1.8                 | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2,3,4,6-Tetrachlorophenol                                                              | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 2,4,5-Trichlorophenol                                                                  | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2,4,6-Trichlorophenol                                                                  | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2,4-Dichlorophenol                                                                     | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2,4-Dimethylphenol                                                                     | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.103                            | JD | 0.0512                           | U |            |  |
| 2,4-Dinitrophenol                                                                      | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 2,4-Dinitrotoluene                                                                     | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2,6-Dinitrotoluene                                                                     | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2-Chloronaphthalene                                                                    | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2-Chlorophenol                                                                         | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2-Methylnaphthalene                                                                    | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.526                            | D | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.245                            | D  | 0.0512                           | U |            |  |
| 2-Methylphenol                                                                         | 0.33  | 100    | 0.33                | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 2-Nitroaniline                                                                         | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 2-Nitrophenol                                                                          | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 3- & 4-Methylphenols                                                                   | 0.33  | 100    | 0.33                | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.186                            | D  | 0.0512                           | U |            |  |
| 3,3-Dichlorobenzidine                                                                  | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 3-Nitroaniline                                                                         | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 4,6-Dinitro-2-methylphenol                                                             | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 4-Bromophenyl phenyl ether                                                             | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 4-Chloro-3-methylphenol                                                                | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 4-Chloroaniline                                                                        | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 4-Chlorophenyl phenyl ether                                                            | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| 4-Nitroaniline                                                                         | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| 4-Nitrophenol                                                                          | ~     | ~      | ~                   | 0.0937                           | U | 0.0952                           | U | 0.101                            | U  | 0.0967                           | U | 0.0914                           | U | 0.0914                           | U | 0.0999                           | U | 0.0930                           | U | 0.0967                           | U | 0.0967                           | U | 0.0937                           | U          | 0.145                            | U | 0.104                            | U  | 0.102                            | U |            |  |
| Acenaphthene                                                                           | 20    | 100    | 98                  | 0.0470                           | U | 0.0477                           | U | 0.0518                           | JD | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 1.020                            | D | 0.0485                           | U | 0.0532                           | JD         | 0.0726                           | U | 0.774                            | D  | 0.0512                           | U |            |  |
| Acenaphthylene                                                                         | 100   | 100    | 107                 | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.209                            | D | 0.0485                           | U | 0.0472                           | JD         | 0.0726                           | U | 2.600                            | D  | 0.0512                           | U |            |  |
| Acetophenone                                                                           | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| Aniline                                                                                | ~     | ~      | ~                   | 0.188                            | U | 0.191                            | U | 0.203                            | U  | 0.194                            | U | 0.183                            | U | 0.183                            | U | 0.200                            | U | 0.186                            | U | 0.194                            | U | 0.194                            | U | 0.188                            | U          | 0.290                            | U | 0.208                            | U  | 0.205                            | U |            |  |
| Anthracene                                                                             | 100   | 100    | 1000                | 0.0470                           | U | 0.0477                           | U | 0.113                            | D  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 1.800                            | D | 0.0485                           | U | 0.158                            | D          | 0.0726                           | U | 4.040                            | D  | 0.0512                           | U |            |  |
| Atrazine                                                                               | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0507                           | U  | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| Benzaldehyde                                                                           | ~     | ~      | ~                   | 0.0470                           | U | 0.0477                           | U | 0.0558                           | JD | 0.0485                           | U | 0.0458                           | U | 0.0458                           | U | 0.0501                           | U | 0.0466                           | U | 0.0485                           | U | 0.0485                           | U | 0.0470                           | U          | 0.0726                           | U | 0.0521                           | U  | 0.0512                           | U |            |  |
| Benidine                                                                               | ~     | ~      | ~                   | 0.188                            | U | 0.191                            | U | 0.203                            | U  | 0.194                            | U | 0.183                            | U | 0.183                            | U | 0.200                            | U | 0.186                            | U | 0.194                            |   |                                  |   |                                  |            |                                  |   |                                  |    |                                  |   |            |  |



| Table 5                                   |        |        |                  |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |    |            |    |            |   |            |   |
|-------------------------------------------|--------|--------|------------------|------------|---|------------|---|------------|---|------------|---|------------|---|------------|---|------------|---|------------|---|------------|---|------------|---|------------|----|------------|----|------------|---|------------|---|
| Pesticides, PCBs and PFAS in Soil Samples |        |        |                  |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |    |            |    |            |   |            |   |
| Clay Street, Brooklyn NY                  |        |        |                  |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |    |            |    |            |   |            |   |
| Sample ID                                 | UUSCO  | RRUSCO | Protection of GW | SB-1 (0-2) |   | SB-1 (4-6) |   | SB-2 (0-2) |   | SB-2 (4-6) |   | SB-3 (0-2) |   | SB-3 (4-6) |   | SB-4 (0-2) |   | SB-4 (4-6) |   | SB-5 (0-2) |   | SB-5 (4-6) |   | SB-6 (0-2) |    | SB-6 (4-6) |    | SB-7 (0-2) |   | SB-7 (4-6) |   |
| Client Matrix                             |        |        |                  | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q | Soil       | Q  | Soil       | Q  | Soil       | Q | Soil       | Q |
| Compound                                  |        |        |                  | Result     |   | Result     |   | Result     |   | Result     |   | Result     |   | Result     |   | Result     |   | Result     |   | Result     |   | Result     |   | Result     |    | Result     |    | Result     |   | Result     |   |
| PEST, 8081 MASTER                         | mg/Kg  | mg/Kg  | mg/Kg            | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |    | mg/Kg      |    | mg/Kg      |   | mg/Kg      |   |
| Dilution Factor                           |        |        |                  | 5          |   | 5          |   | 5          |   | 5          |   | 5          |   | 5          |   | 5          |   | 5          |   | 5          |   | 5          |   | 5          |    | 5          |    | 5          |   | 5          |   |
| 4,4'-DDD                                  | 0.0033 | 13     | 14               | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| 4,4'-DDE                                  | 0.0033 | 8.9    | 17               | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | NT         | U | 0.00201    | U |
| 4,4'-DDE [2C]                             | ~      | ~      | ~                | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |    | NT         |    | 0.00204    | U | NT         |   |
| 4,4'-DDT                                  | 0.0033 | 7.9    | 136              | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | NT         |    | 0.00194    | U  | 0.00278    | D | 0.00201    | U |
| 4,4'-DDT [2C]                             | ~      | ~      | ~                | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | 0.00186    | U  | 0.00194    | U  | NT         |   | NT         |   |
| Aldrin                                    | 0.005  | 0.097  | 0.19             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| alpha-BHC                                 | 0.02   | 0.48   | 0.02             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| alpha-Chlordane                           | 0.094  | 4.2    | 2.9              | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | NT         |    | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| alpha-Chlordane [2C]                      | ~      | ~      | ~                | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | NT         |   |
| beta-BHC                                  | 0.036  | 0.36   | 0.09             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Chlordane, total                          | ~      | ~      | ~                | 0.0368     | U | 0.0374     | U | 0.0403     | U | 0.0380     | U | 0.0359     | U | 0.0362     | U | 0.0393     | U | 0.0370     | U | 0.0381     | U | 0.0385     | U | NT         |    | 0.0388     | U  | 0.0408     | U | 0.0402     | U |
| Chlordane, total [2C]                     | ~      | ~      | ~                | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | 0.0372     | UP | NT         |    | NT         |   | NT         |   |
| delta-BHC                                 | 0.04   | 100    | 0.25             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00263    | D  | 0.00194    | UP | 0.00204    | U | 0.00201    | U |
| Dieldrin                                  | 0.005  | 0.2    | 0.1              | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Endosulfan I                              | 2.4    | 24     | 102              | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Endosulfan II                             | 2.4    | 24     | 102              | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Endosulfan sulfate                        | 2.4    | 24     | 1000             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Endrin                                    | 0.014  | 11     | 0.06             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Endrin aldehyde                           | ~      | ~      | ~                | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Endrin ketone                             | ~      | ~      | ~                | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| gamma-BHC (Lindane)                       | 0.1    | 1.3    | 0.1              | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| gamma-Chlordane                           | ~      | ~      | ~                | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | NT         |    | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| gamma-Chlordane [2C]                      | ~      | ~      | ~                | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | NT         |   | 0.00186    | U  | NT         |    | NT         |   | NT         |   |
| Heptachlor                                | 0.042  | 2.1    | 0.38             | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Heptachlor epoxide                        | ~      | ~      | ~                | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Methoxychlor                              | ~      | ~      | ~                | 0.00184    | U | 0.00187    | U | 0.00202    | U | 0.00190    | U | 0.00180    | U | 0.00181    | U | 0.00196    | U | 0.00185    | U | 0.00191    | U | 0.00193    | U | 0.00186    | U  | 0.00194    | U  | 0.00204    | U | 0.00201    | U |
| Toxaphene                                 | ~      | ~      | ~                | 0.184      | U | 0.187      | U | 0.202      | U | 0.190      | U | 0.180      | U | 0.181      | U | 0.196      | U | 0.185      | U | 0.191      | U | 0.193      | U | 0.186      | U  | 0.194      | U  | 0.204      | U | 0.201      | U |
| Total Solids                              |        |        |                  | %          |   | %          |   | %          |   | %          |   | %          |   | %          |   | %          |   | %          |   | %          |   | %          |   | %          |    | %          |    | %          |   | %          |   |
| Dilution Factor                           |        |        |                  | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |    | 1          |    | 1          |   | 1          |   |
| % Solids                                  | ~      | ~      | ~                | 88.700     |   | 87.300     |   | 81         |   | 85.900     |   | 91         |   | 90.300     |   | 83.200     |   | 88.200     |   | 85.700     |   | 84.800     |   | 87.900     |    | 84.200     |    | 80         |   | 81.400     |   |
| PCB, 8082 MASTER                          | mg/Kg  | mg/Kg  | mg/Kg            | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |   | mg/Kg      |    | mg/Kg      |    | mg/Kg      |   | mg/Kg      |   |
| Dilution Factor                           |        |        |                  | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |   | 1          |    | 1          |    | 1          |   | 1          |   |
| Aroclor 1016                              | ~      | ~      | ~                | 0.0186     | U | 0.0189     | U | 0.0204     | U | 0.0192     | U | 0.0181     | U | 0.0183     | U | 0.0198     | U | 0.0187     | U | 0.0193     | U | 0.0194     | U | 0.0188     | U  | 0.0196     | U  | 0.0206     | U | 0.0203     | U |
| Aroclor 1221                              | ~      | ~      | ~                | 0.0186     | U | 0.0189     |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |   |            |    |            |    |            |   |            |   |

| Table 6<br>Volatile Organic Compounds Detected in Soil<br>Commercial Street, Brooklyn NY |                                                                |                                                                                          |                                                                                    |                                                            |                                                            |                                                           |                                                           |                                                            |                                                            |  |  |  |  |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|--|--|--|--|
| Sample ID                                                                                | NYSDEC Part 375<br>Unrestricted Use Soil<br>Cleanup Objectives | NYSDEC Part 375<br>Restricted Use Soil<br>Cleanup Objectives -<br>Restricted Residential | NYSDEC Part 375<br>Restricted Use Soil<br>Cleanup Objectives -<br>Protection of GW | SB-8 (0-2')<br>2380727-05<br>2/13/2023 10:00:00 AM<br>Soil | SB-8 (4-6')<br>2380727-06<br>2/13/2023 10:30:00 AM<br>Soil | SB-9 (0-2')<br>2380727-01<br>2/13/2023 9:05:00 AM<br>Soil | SB-9 (4-6')<br>2380727-02<br>2/13/2023 9:15:00 AM<br>Soil | SB-10 (0-2')<br>2380727-03<br>2/13/2023 9:35:00 AM<br>Soil | SB-10 (4-6')<br>2380727-04<br>2/13/2023 9:40:00 AM<br>Soil |  |  |  |  |
| Sampling Date                                                                            |                                                                |                                                                                          |                                                                                    |                                                            |                                                            |                                                           |                                                           |                                                            |                                                            |  |  |  |  |
| Client Matrix                                                                            |                                                                |                                                                                          |                                                                                    |                                                            |                                                            |                                                           |                                                           |                                                            |                                                            |  |  |  |  |
| Compound                                                                                 | mg/kg                                                          | mg/kg                                                                                    | mg/kg                                                                              | mg/kg                                                      | mg/kg                                                      | mg/kg                                                     | mg/kg                                                     | mg/kg                                                      | mg/kg                                                      |  |  |  |  |
| VOA, B260 MASTER                                                                         |                                                                |                                                                                          |                                                                                    |                                                            |                                                            |                                                           |                                                           |                                                            |                                                            |  |  |  |  |
| Dilution Factor                                                                          | ~                                                              | ~                                                                                        | ~                                                                                  | 1                                                          | 1                                                          | 1                                                         | 1                                                         | 1                                                          | 1                                                          |  |  |  |  |
| 1,1,1,2-Tetrachloroethane                                                                | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1,1-Trichloroethane                                                                    | 0.68                                                           | 100                                                                                      | 0.68                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1,2,2-Tetrachloroethane                                                                | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)                                        | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1,2-Trichloroethane                                                                    | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1-Dichloroethane                                                                       | 0.27                                                           | 26                                                                                       | 0.27                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1-Dichloroethylene                                                                     | 0.33                                                           | 100                                                                                      | 0.33                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,1-Dichloropropylene                                                                    | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2,3-Trichlorobenzene                                                                   | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2,3-Trichloropropane                                                                   | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2,4,5-Tetramethylbenzene                                                               | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2,4-Trichlorobenzene                                                                   | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2,4-Trimethylbenzene                                                                   | 3.6                                                            | 52                                                                                       | 3.6                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2-Dibromo-3-chloropropane                                                              | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2-Dibromomethane                                                                       | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2-Dichlorobenzene                                                                      | 1.1                                                            | 100                                                                                      | 1.1                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2-Dichloroethane                                                                       | 0.02                                                           | 3.1                                                                                      | 0.02                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,2-Dichloropropane                                                                      | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,3,5-Trimethylbenzene                                                                   | 8.4                                                            | 52                                                                                       | 8.4                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,3-Dichlorobenzene                                                                      | 2.4                                                            | 49                                                                                       | 2.4                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,3-Dichloropropane                                                                      | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,4-Dichlorobenzene                                                                      | 1.8                                                            | 13                                                                                       | 1.8                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 1,4-Dioxane                                                                              | 0.1                                                            | 13                                                                                       | 0.1                                                                                | 0.0930                                                     | U                                                          | 0.160                                                     | U                                                         | 0.0690                                                     | U                                                          |  |  |  |  |
| 2,2-Dichloropropane                                                                      | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 2-Butanone                                                                               | 0.12                                                           | 100                                                                                      | 0.12                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 2-Chloroethylvinyl ether                                                                 | ~                                                              | ~                                                                                        | ~                                                                                  | 0.190                                                      | U                                                          | 0.0320                                                    | U                                                         | 0.0110                                                     | U                                                          |  |  |  |  |
| 2-Chlorotoluene                                                                          | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 2-Hexanone                                                                               | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 4-Chlorotoluene                                                                          | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| 4-Methyl-2-pentanone                                                                     | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Acetone                                                                                  | 0.05                                                           | 100                                                                                      | 0.05                                                                               | 0.0930                                                     | J                                                          | 0.0280                                                    | J                                                         | 0.0220                                                     | J                                                          |  |  |  |  |
| Acrolein                                                                                 | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00930                                                    | U                                                          | 0.0160                                                    | U                                                         | 0.00530                                                    | U                                                          |  |  |  |  |
| Acrylonitrile                                                                            | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Benzene                                                                                  | 0.06                                                           | 4.8                                                                                      | 0.06                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Bromobenzene                                                                             | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Bromochloromethane                                                                       | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Bromodichloromethane                                                                     | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Bromoforn                                                                                | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Bromomethane                                                                             | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Carbon disulfide                                                                         | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Carbon tetrachloride                                                                     | 0.76                                                           | 2.4                                                                                      | 0.76                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Chlorobenzene                                                                            | 1.1                                                            | 100                                                                                      | 1.1                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Chloroethane                                                                             | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Chloroform                                                                               | 0.37                                                           | 49                                                                                       | 0.37                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Chloromethane                                                                            | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| cis-1,2-Dichloroethylene                                                                 | 0.25                                                           | 100                                                                                      | 0.25                                                                               | 0.0320                                                     | U                                                          | 0.00300                                                   | U                                                         | 0.00260                                                    | U                                                          |  |  |  |  |
| cis-1,3-Dichloropropylene                                                                | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Cyclohexane                                                                              | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Dibromochloromethane                                                                     | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Dibromomethane                                                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Dichlorodifluoromethane                                                                  | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Diisopropyl ether (DIPE)                                                                 | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00750                                                    | U                                                          | 0.0130                                                    | U                                                         | 0.00420                                                    | U                                                          |  |  |  |  |
| Ethanol                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                  | 0.0750                                                     | U                                                          | 0.130                                                     | U                                                         | 0.0550                                                     | U                                                          |  |  |  |  |
| Ethyl Benzene                                                                            | 1                                                              | 41                                                                                       | 1                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Ethyl tert-butyl ether (ETBE)                                                            | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00750                                                    | U                                                          | 0.0130                                                    | U                                                         | 0.00420                                                    | U                                                          |  |  |  |  |
| Hexachlorobutadiene                                                                      | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Iodomethane                                                                              | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Isopropylbenzene                                                                         | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Methyl acetate                                                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Methyl Methacrylate                                                                      | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Methyl tert-butyl ether (MTBE)                                                           | 0.93                                                           | 100                                                                                      | 0.93                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Methylcyclohexane                                                                        | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Methylene chloride                                                                       | 0.05                                                           | 100                                                                                      | 0.05                                                                               | 0.0130                                                     | J                                                          | 0.0310                                                    | J                                                         | 0.0120                                                     | J                                                          |  |  |  |  |
| Naphthalene                                                                              | 12                                                             | 100                                                                                      | 12                                                                                 | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| n-Butylbenzene                                                                           | 12                                                             | 100                                                                                      | 12                                                                                 | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| n-Propylbenzene                                                                          | 3.9                                                            | 100                                                                                      | 3.9                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| o-Xylene                                                                                 | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| p- & m- Xylenes                                                                          | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00930                                                    | U                                                          | 0.0160                                                    | U                                                         | 0.00530                                                    | U                                                          |  |  |  |  |
| p-Diethylbenzene                                                                         | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| p-Ethyltoluene                                                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| p-Isopropyltoluene                                                                       | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| sec-Butylbenzene                                                                         | 11                                                             | 100                                                                                      | 11                                                                                 | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Styrene                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00260                                                    | U                                                          |  |  |  |  |
| tert-Amyl alcohol (TAA)                                                                  | ~                                                              | ~                                                                                        | ~                                                                                  | 0.0750                                                     | U                                                          | 0.130                                                     | U                                                         | 0.0420                                                     | U                                                          |  |  |  |  |
| tert-Amyl methyl ether (TAME)                                                            | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00750                                                    | U                                                          | 0.0130                                                    | U                                                         | 0.00420                                                    | U                                                          |  |  |  |  |
| tert-Butyl alcohol (TBA)                                                                 | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| tert-Butylbenzene                                                                        | 5.9                                                            | 100                                                                                      | 5.9                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Tetrachloroethylene                                                                      | 1.3                                                            | 19                                                                                       | 1.3                                                                                | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Tetrahydrofuran                                                                          | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00930                                                    | U                                                          | 0.0160                                                    | U                                                         | 0.00530                                                    | U                                                          |  |  |  |  |
| Toluene                                                                                  | 0.7                                                            | 100                                                                                      | 0.7                                                                                | 0.0100                                                     | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| trans-1,2-Dichloroethylene                                                               | 0.19                                                           | 100                                                                                      | 0.19                                                                               | 0.00700                                                    | J                                                          | 0.00800                                                   | U                                                         | 0.00260                                                    | U                                                          |  |  |  |  |
| trans-1,3-Dichloropropylene                                                              | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| trans-1,4-dichloro-2-butene                                                              | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Trichloroethylene                                                                        | 0.47                                                           | 21                                                                                       | 0.47                                                                               | 0.0730                                                     | U                                                          | 0.00800                                                   | U                                                         | 0.00260                                                    | U                                                          |  |  |  |  |
| Trichlorofluoromethane                                                                   | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Vinyl acetate                                                                            | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Vinyl Chloride                                                                           | 0.02                                                           | 0.9                                                                                      | 0.02                                                                               | 0.00470                                                    | U                                                          | 0.00800                                                   | U                                                         | 0.00340                                                    | U                                                          |  |  |  |  |
| Xylenes, Total                                                                           | 0.26                                                           | 100                                                                                      | 1.6                                                                                | 0.0140                                                     | U                                                          | 0.0240                                                    | U                                                         | 0.00900                                                    | U                                                          |  |  |  |  |

**NOTES:**

Any Regulatory Exceedences are color coded by Regulation

**Q** is the Qualifier Column with definitions as follows:

D= result is from an analysis that required a dilution

J= analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U= analyte not detected at or above the level indicated

B= analyte found in the analysis batch blank

E= result is estimated and cannot be accurately reported due to levels encountered or interferences

P= this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

NT= this indicates the analyte was not a target for this sample

~= this indicates that no regulatory limit has been established for this analyte

| Table 7<br>Semi-Volatile Organic Compounds Detected in Soil<br>Commercial Street, Brooklyn NY |                                                                |                                                                                          |                                                                                   |                                                           |                                                           |                                                          |                                                          |                                                           |                                                           |        |   |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|--------|---|
| Sample ID                                                                                     | NYSDEC Part 375<br>Unrestricted Use Soil<br>Cleanup Objectives | NYSDEC Part 375<br>Restricted Use Soil<br>Cleanup Objectives -<br>Restricted Residential | NYSDEC Part 375<br>Restricted Use Soil<br>Cleanup Objectives-<br>Protection of GW | SB-8 (0-2)<br>2380727-05<br>2/13/2023 10:10:00 AM<br>Soil | SB-8 (4-6)<br>2380727-06<br>2/13/2023 10:38:00 AM<br>Soil | SB-9 (0-2)<br>2380727-01<br>2/13/2023 9:05:00 AM<br>Soil | SB-9 (4-6)<br>2380727-02<br>2/13/2023 9:15:00 AM<br>Soil | SB-10 (0-2)<br>2380727-03<br>2/13/2023 9:35:00 AM<br>Soil | SB-10 (4-6)<br>2380727-04<br>2/13/2023 9:40:00 AM<br>Soil |        |   |
| Compound                                                                                      | mg/Kg                                                          | mg/Kg                                                                                    | mg/Kg                                                                             | Result                                                    | Q                                                         | Result                                                   | Q                                                        | Result                                                    | Q                                                         | Result | Q |
| Semi-Volatiles, 1,4 Dioxane B270 SIM-Soil                                                     |                                                                |                                                                                          |                                                                                   |                                                           |                                                           |                                                          |                                                          |                                                           |                                                           | mg/Kg  |   |
| 1,4-Dioxane                                                                                   | 0.1                                                            | 13                                                                                       | 0.1                                                                               | NT                                                        |                                                           | NT                                                       |                                                          | NT                                                        |                                                           | 1      |   |
| Dilution Factor                                                                               |                                                                |                                                                                          |                                                                                   |                                                           |                                                           |                                                          |                                                          |                                                           |                                                           | 0.0190 |   |
| WGA, B270 MASTER                                                                              | mg/Kg                                                          | mg/Kg                                                                                    | mg/Kg                                                                             | 25                                                        | 2                                                         | mg/Kg                                                    | 25                                                       | mg/Kg                                                     | 2                                                         | mg/Kg  |   |
| 1,1-Biphenyl                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                 | 0.344                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0891                                                    | ID                                                        | 0.0488 | U |
| 1,2,4,5-Tetrachlorobenzene                                                                    | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 1,2,4-Trichlorobenzene                                                                        | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0488                                                    | U                                                         | 0.0488 | U |
| 1,2-Dichlorobenzene                                                                           | 1.1                                                            | 100                                                                                      | 1.1                                                                               | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 1,2-Diphenylhydrazine (as Azobenzene)                                                         | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 1,3-Dichlorobenzene                                                                           | 2.4                                                            | 49                                                                                       | 2.4                                                                               | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 1,4-Dichlorobenzene                                                                           | 1.8                                                            | 13                                                                                       | 1.8                                                                               | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2,3,4,6-Tetrachlorophenol                                                                     | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 2,4,5-Trichlorophenol                                                                         | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2,4,6-Trichlorophenol                                                                         | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2,4-Dichlorophenol                                                                            | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2,4-Dimethylphenol                                                                            | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2,4-Dinitrophenol                                                                             | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 2,4-Dinitrotoluene                                                                            | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2-Chloronaphthalene                                                                           | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2-Chlorophenol                                                                                | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2-Methylnaphthalene                                                                           | ~                                                              | ~                                                                                        | ~                                                                                 | 1.490                                                     | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2-Methylphenol                                                                                | 0.33                                                           | 100                                                                                      | 0.33                                                                              | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 2-Nitroaniline                                                                                | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 2-Nitrophenol                                                                                 | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 3, 4 & 4-Methylphenols                                                                        | 0.33                                                           | 100                                                                                      | 0.33                                                                              | 0.0992                                                    | ID                                                        | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 3,3-Dichlorobenzidine                                                                         | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 3-Nitroaniline                                                                                | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 4,6-Dinitro-2-methylphenol                                                                    | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 4-Bromophenyl phenyl ether                                                                    | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 4-Chloro-3-methylphenol                                                                       | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 4-Chloroaniline                                                                               | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 4-Chlorophenyl phenyl ether                                                                   | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| 4-Nitroaniline                                                                                | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| 4-Nitrophenol                                                                                 | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| Acenaphthene                                                                                  | 20                                                             | 100                                                                                      | 98                                                                                | 2.020                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0488                                                    | ID                                                        | 0.0488 | U |
| Acenaphthylene                                                                                | 100                                                            | 100                                                                                      | 107                                                                               | 0.573                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0716                                                    | ID                                                        | 0.0488 | U |
| Acetophenone                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Aniline                                                                                       | ~                                                              | ~                                                                                        | ~                                                                                 | 0.256                                                     | U                                                         | 0.201                                                    | U                                                        | 0.191                                                     | U                                                         | 0.195  | U |
| Anthracene                                                                                    | 100                                                            | 100                                                                                      | 1000                                                                              | 5.900                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.150                                                     | D                                                         | 0.0488 | U |
| Axetazine                                                                                     | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Benzaldehyde                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                 | 0.469                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Benzoindole                                                                                   | ~                                                              | ~                                                                                        | ~                                                                                 | 0.256                                                     | U                                                         | 0.201                                                    | U                                                        | 0.191                                                     | U                                                         | 0.195  | U |
| Benzo(a)anthracene                                                                            | 1                                                              | 1                                                                                        | 1                                                                                 | 9.060                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.454                                                     | D                                                         | 0.0488 | U |
| Benzo(a)pyrene                                                                                | 1                                                              | 1                                                                                        | 22                                                                                | 8.110                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.436                                                     | D                                                         | 0.0488 | U |
| Benzo(b)fluoranthene                                                                          | 1                                                              | 1                                                                                        | 1.7                                                                               | 6.130                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.441                                                     | D                                                         | 0.0488 | U |
| Benzo(g,h,i)perylene                                                                          | 100                                                            | 100                                                                                      | 1000                                                                              | 4.150                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.251                                                     | D                                                         | 0.0488 | U |
| Benzo(k)fluoranthene                                                                          | 0.8                                                            | 3.9                                                                                      | 1.7                                                                               | 7.640                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.381                                                     | D                                                         | 0.0488 | U |
| Benzoic acid                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                 | 0.135                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Benzyl alcohol                                                                                | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Benzyl butyl phthalate                                                                        | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Bi(2-chloroethoxy)methane                                                                     | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Bi(2-chloroethyl)ether                                                                        | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Bi(2-chloroisopropyl)ether                                                                    | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Bi(2-ethylhexyl)phthalate                                                                     | ~                                                              | ~                                                                                        | ~                                                                                 | 0.259                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Caprolactam                                                                                   | ~                                                              | ~                                                                                        | ~                                                                                 | 0.128                                                     | U                                                         | 0.100                                                    | U                                                        | 0.0953                                                    | U                                                         | 0.0974 | U |
| Carbazole                                                                                     | ~                                                              | ~                                                                                        | ~                                                                                 | 2.290                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0716                                                    | ID                                                        | 0.0488 | U |
| Chrysene                                                                                      | 1                                                              | 3.9                                                                                      | 1                                                                                 | 9.060                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.483                                                     | D                                                         | 0.0488 | U |
| Dibenz(a,h)anthracene                                                                         | 0.33                                                           | 0.33                                                                                     | 1000                                                                              | 3.270                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0944                                                    | ID                                                        | 0.0488 | U |
| Dibenzofuran                                                                                  | 7                                                              | 59                                                                                       | 210                                                                               | 3.070                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0525                                                    | D                                                         | 0.0488 | U |
| Diethyl phthalate                                                                             | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Dimethyl phthalate                                                                            | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Di-n-butyl phthalate                                                                          | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Di-n-octyl phthalate                                                                          | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Fluoranthene                                                                                  | 100                                                            | 100                                                                                      | 1000                                                                              | 20.500                                                    | D                                                         | 0.0502                                                   | U                                                        | 0.898                                                     | D                                                         | 0.0488 | U |
| Fluorene                                                                                      | 30                                                             | 100                                                                                      | 386                                                                               | 2.190                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0480                                                    | ID                                                        | 0.0488 | U |
| Hexachlorobenzene                                                                             | 0.33                                                           | 1.2                                                                                      | 3.2                                                                               | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Hexachlorobutadiene                                                                           | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Hexachlorocyclopentadiene                                                                     | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Hexachloroethane                                                                              | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Indeno(1,2,3-cd)pyrene                                                                        | 0.5                                                            | 0.5                                                                                      | 8.2                                                                               | 3.480                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.293                                                     | D                                                         | 0.0488 | U |
| Isothiazole                                                                                   | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Naphthalene                                                                                   | 12                                                             | 100                                                                                      | 12                                                                                | 2.830                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.495                                                     | D                                                         | 0.0488 | U |
| Nitrobenzene                                                                                  | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| N-Nitrosodimethylamine                                                                        | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| N-Nitroso-di-n-propylamine                                                                    | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| N-Nitrosodiphenylamine                                                                        | ~                                                              | ~                                                                                        | ~                                                                                 | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Pentachlorophenol                                                                             | 0.8                                                            | 6.7                                                                                      | 0.8                                                                               | 0.0641                                                    | U                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Phenanthrene                                                                                  | 100                                                            | 100                                                                                      | 1000                                                                              | 21.100                                                    | D                                                         | 0.0502                                                   | U                                                        | 0.756                                                     | ID                                                        | 0.0488 | U |
| Phenol                                                                                        | 0.33                                                           | 100                                                                                      | 0.33                                                                              | 0.459                                                     | D                                                         | 0.0502                                                   | U                                                        | 0.0477                                                    | U                                                         | 0.0488 | U |
| Pyrene                                                                                        | 100                                                            | 100                                                                                      | 1000                                                                              | 17.600                                                    | D                                                         | 0.0502                                                   | U                                                        | 0.860                                                     | D                                                         | 0.0488 | U |

NOTES:  
 Any Regulatory Exceedences are color coded by Regulation  
 Q is the Qualifier Column with definitions as follows:  
 D=Result is from an analysis that required a dilution  
 I=Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated  
 U=Analyte not detected at or above the level indicated  
 B=Analyte found in the analysis batch blank  
 E=Result is estimated and cannot be accurately reported due to levels encountered or interferences  
 P=This flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis  
 NT=this indicates the analyte was not a target for this sample  
 ~this indicates that no regulatory limit has been established for this analyte



**Table 8**  
**Inorganic Constituents Detected in Soil**  
**Commercial Street, Brooklyn NY**

| Sample ID              |       |       |       | SB-8 (0-2')<br>2380727-05 |   | SB-8 (4-6')<br>2380727-06 |   | SB-9 (0-2')<br>2380727-01 |   | SB-9 (4-6')<br>2380727-02 |   | SB-10 (0-2')<br>2380727-03 |   | SB-10 (4-6')<br>2380727-04 |   |
|------------------------|-------|-------|-------|---------------------------|---|---------------------------|---|---------------------------|---|---------------------------|---|----------------------------|---|----------------------------|---|
| Work ID                |       |       |       | 2/13/2023 10:10:00 AM     |   | 2/13/2023 10:38:00 AM     |   | 2/13/2023 9:05:00 AM      |   | 2/13/2023 9:15:00 AM      |   | 2/13/2023 9:35:00 AM       |   | 2/13/2023 9:40:00 AM       |   |
| Sampling Date          |       |       |       | Soil                      |   | Soil                      |   | Soil                      |   | Soil                      |   | Soil                       |   | Soil                       |   |
| Client Matrix          |       |       |       |                           |   |                           |   |                           |   |                           |   |                            |   |                            |   |
| Compound               |       |       |       | Result                    | Q | Result                    | Q | Result                    | Q | Result                    | Q | Result                     | Q | Result                     | Q |
| Metals, Target Analyte | mg/Kg | mg/Kg | mg/Kg | mg/Kg                     |   | mg/Kg                     |   | mg/Kg                     |   | mg/Kg                     |   | mg/Kg                      |   | mg/Kg                      |   |
| Dilution Factor        |       |       |       | 1                         |   | 1                         |   | 1                         |   | 1                         |   | 1                          |   | 1                          |   |
| Aluminum               | ~     | ~     | ~     | 2,620                     |   | 788                       |   | 1,290                     |   | 8,330                     |   | 478                        |   | 610                        |   |
| Antimony               | ~     | ~     | ~     | 8.800                     |   | 2.690                     |   | 4.900                     |   | U                         |   | 4.300                      |   | 4.230                      |   |
| Arsenic                | 13    | 16    | 16    | 7.160                     |   | 3.280                     |   | 23.200                    |   | 5.240                     |   | 3.460                      |   | 3.840                      |   |
| Barium                 | 350   | 400   | 820   | 136                       |   | 29.600                    |   | 59.900                    |   | 44.200                    |   | 147                        |   | 42.300                     |   |
| Beryllium              | 7.2   | 72    | 47    | 0.304                     |   | 0.0900                    |   | 0.191                     |   | 0.466                     |   | 0.0940                     |   | 0.114                      |   |
| Cadmium                | 2.5   | 4.3   | 7.5   | 2.070                     |   | 0.301                     |   | 0.299                     |   | 0.293                     |   | 0.410                      |   | 0.317                      |   |
| Calcium                | ~     | ~     | ~     | 4,630                     | B | 172                       |   | 830                       | B | 536                       |   | 544                        | B | 420                        | B |
| Chromium               | ~     | ~     | ~     | 33.200                    |   | 1.670                     |   | 6.580                     |   | 14.500                    |   | 1.370                      |   | 2.350                      |   |
| Cobalt                 | ~     | ~     | ~     | 4.540                     |   | 0.568                     |   | 4.760                     |   | 6.250                     |   | 0.810                      |   | 0.804                      |   |
| Copper                 | 50    | 270   | 1720  | 365                       |   | 2.010                     |   | 46.500                    | U | 35.200                    |   | 18.100                     |   | 3.330                      |   |
| Iron                   | ~     | ~     | ~     | 30,400                    |   | 25,500                    |   | 42,000                    |   | 18,900                    |   | 30,300                     |   | 36,100                     |   |
| Lead                   | 63    | 400   | 450   | 1,180                     |   | 28.100                    |   | 982                       |   | 13.200                    |   | 436                        |   | 22.400                     |   |
| Magnesium              | ~     | ~     | ~     | 1,200                     |   | 168                       |   | 378                       |   | 2,420                     |   | 103                        |   | 119                        |   |
| Manganese              | 1600  | 2000  | 2000  | 243                       |   | 8.670                     |   | 56.500                    |   | 247                       |   | 20.800                     |   | 6                          |   |
| Nickel                 | 30    | 310   | 130   | 74,700                    |   | 2.440                     |   | 9.560                     |   | 15.400                    |   | 5.510                      |   | 1.900                      |   |
| Potassium              | ~     | ~     | ~     | 871                       |   | 1,670                     |   | 1,260                     |   | 1,340                     |   | 1,100                      |   | 2,030                      |   |
| Selenium               | 3.9   | 180   | 4     | 3.200                     | U | 2.510                     |   | 2.410                     | U | 2.440                     |   | 2.470                      | U | 2.640                      | U |
| Silver                 | 2     | 180   | 8.3   | 0.646                     | U | 0.506                     |   | 0.486                     | U | 0.492                     |   | 0.498                      | U | 0.533                      | U |
| Sodium                 | ~     | ~     | ~     | 82.800                    |   | 1,710                     |   | 657                       |   | 51.200                    |   | 1,940                      |   | 3,120                      |   |
| Thallium               | ~     | ~     | ~     | 3.200                     | U | 2.510                     |   | 2.410                     | U | 2.440                     |   | 2.470                      | U | 2.640                      | U |
| Vanadium               | ~     | ~     | ~     | 41.100                    |   | 5.340                     |   | 12.100                    |   | 21.700                    |   | 2.110                      |   | 2.400                      |   |
| Zinc                   | 109   | 10000 | 2480  | 476                       |   | 5.730                     |   | 289                       |   | 300                       |   | 67.600                     |   | 5.080                      |   |
| Mercury by 7473        | mg/Kg | mg/Kg | mg/Kg | mg/Kg                     |   | mg/Kg                     |   | mg/Kg                     |   | mg/Kg                     |   | mg/Kg                      |   | mg/Kg                      |   |
| Dilution Factor        |       |       |       | 1                         |   | 1                         |   | 1                         |   | 1                         |   | 1                          |   | 1                          |   |
| Mercury                | 0.18  | 0.81  | 0.73  | 1.060                     |   | 0.0362                    | U | 0.847                     |   | 0.0352                    | U | 4.280                      |   | 0.0381                     | U |

**NOTES:**

Any Regulatory Exceedences are color coded by Regulation

**Q is the Qualifier Column with definitions as follows:**

D=result is from an analysis that required a dilution

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

B=analyte found in the analysis batch blank

E=result is estimated and cannot be accurately reported due to levels encountered or interferences

P=this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

NT=this indicates the analyte was not a target for this sample

~=this indicates that no regulatory limit has been established for this analyte



**Table 9**  
**Pesticides, PCBs and PFAS Detected in Soil**  
**Commercial Street, Brooklyn NY**

| Sample ID<br>York ID<br>Sampling Date<br>Client Matrix | NYSDEC Part 375<br>Unrestricted Use Soil<br>Cleanup Objectives | NYSDEC Part 375<br>Restricted Use Soil<br>Cleanup Objectives -<br>Restricted Residential | NYSDEC Part 375<br>Restricted Use Soil<br>Cleanup Objectives -<br>Protection of GW | SB-8 (0-2')<br>2380727-05<br>2/13/2023 10:10:00 AM<br>Soil | SB-8 (4-6')<br>2380727-06<br>2/13/2023 10:38:00 AM<br>Soil | SB-9 (0-2')<br>2380727-01<br>2/13/2023 9:05:00 AM<br>Soil | SB-9 (4-6')<br>2380727-02<br>2/13/2023 9:15:00 AM<br>Soil | SB-10 (0-2')<br>2380727-03<br>2/13/2023 9:35:00 AM<br>Soil | SB-10 (4-6')<br>2380727-04<br>2/13/2023 9:40:00 AM<br>Soil |
|--------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|
| Compound                                               |                                                                |                                                                                          |                                                                                    | Result                                                     | Q                                                          | Result                                                    | Q                                                         | Result                                                     | Q                                                          |
| PEST, 8081 MASTER                                      | mg/Kg                                                          | mg/Kg                                                                                    | mg/Kg                                                                              | mg/Kg                                                      |                                                            | mg/Kg                                                     |                                                           | mg/Kg                                                      | mg/Kg                                                      |
| Dilution Factor                                        |                                                                |                                                                                          |                                                                                    | 50                                                         |                                                            | 5                                                         |                                                           | 5                                                          | 5                                                          |
| 4,4'-DDD                                               | 0.0033                                                         | 13                                                                                       | 14                                                                                 | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| 4,4'-DDD [2C]                                          | ~                                                              | ~                                                                                        | 17                                                                                 | NT                                                         |                                                            | NT                                                        | UP                                                        | 0.00195                                                    | UP                                                         |
| 4,4'-DDE                                               | 0.0033                                                         | 8.9                                                                                      | ~                                                                                  | 0.956                                                      | D                                                          | 0.00234                                                   | D                                                         | 0.00193                                                    | D                                                          |
| 4,4'-DDT                                               | 0.0033                                                         | 7.9                                                                                      | 136                                                                                | 0.307                                                      | DP                                                         | 0.00781                                                   | D                                                         | 0.00264                                                    | D                                                          |
| Aldrin                                                 | 0.005                                                          | 0.097                                                                                    | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| alpha-BHC                                              | 0.02                                                           | 0.48                                                                                     | 0.19                                                                               | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| alpha-Chlordane                                        | 0.094                                                          | 4.2                                                                                      | 0.02                                                                               | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| alpha-Chlordane [2C]                                   | ~                                                              | ~                                                                                        | 2.9                                                                                | NT                                                         |                                                            | NT                                                        | UP                                                        | 0.00195                                                    | U                                                          |
| beta-BHC                                               | 0.036                                                          | 0.36                                                                                     | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Chlordane, total                                       | ~                                                              | ~                                                                                        | 0.09                                                                               | 0.0506                                                     |                                                            | 0.0396                                                    | U                                                         | 0.00195                                                    | U                                                          |
| Chlordane, total [2C]                                  | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        | UP                                                        | 0.0390                                                     | UP                                                         |
| delta-BHC                                              | 0.04                                                           | 100                                                                                      | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Dieldrin                                               | 0.005                                                          | 0.2                                                                                      | 0.25                                                                               | 0.369                                                      | DP                                                         | NT                                                        | U                                                         | 0.00195                                                    | UP                                                         |
| Dieldrin [2C]                                          | ~                                                              | ~                                                                                        | 0.1                                                                                | NT                                                         |                                                            | 0.00248                                                   | D                                                         | NT                                                         | NT                                                         |
| Endosulfan I                                           | 2.4                                                            | 24                                                                                       | 102                                                                                | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Endosulfan II                                          | 2.4                                                            | 24                                                                                       | 102                                                                                | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Endosulfan sulfate                                     | 2.4                                                            | 24                                                                                       | 1000                                                                               | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Endrin                                                 | 0.014                                                          | 11                                                                                       | 0.06                                                                               | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Endrin aldehyde                                        | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Endrin ketone                                          | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| gamma-BHC (Lindane)                                    | 0.1                                                            | 1.3                                                                                      | 0.1                                                                                | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| gamma-Chlordane                                        | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| gamma-Chlordane [2C]                                   | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        | UP                                                        | 0.00195                                                    | UP                                                         |
| Heptachlor                                             | 0.042                                                          | 2.1                                                                                      | 0.38                                                                               | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Heptachlor epoxide                                     | ~                                                              | ~                                                                                        | ~                                                                                  | 0.178                                                      | DP                                                         | ~                                                         | UP                                                        | 0.00193                                                    | U                                                          |
| Methoxychlor                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.00253                                                    | U                                                          | 0.00198                                                   | U                                                         | 0.00193                                                    | U                                                          |
| Toxaphene                                              | ~                                                              | ~                                                                                        | ~                                                                                  | 0.253                                                      | U                                                          | 0.198                                                     | U                                                         | 0.193                                                      | U                                                          |
| PCB, 8082 MASTER                                       | mg/Kg                                                          | mg/Kg                                                                                    | mg/Kg                                                                              | mg/Kg                                                      |                                                            | mg/Kg                                                     |                                                           | mg/Kg                                                      | mg/Kg                                                      |
| Dilution Factor                                        |                                                                |                                                                                          |                                                                                    | 10                                                         |                                                            | 1                                                         |                                                           | 1                                                          | 1                                                          |
| Aroclor 1016                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0190                                                     | U                                                          |
| Aroclor 1221                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1232                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1242                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1248                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1254                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 7.930                                                      | D                                                          | 0.438                                                     | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1260                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1262                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Aroclor 1268                                           | ~                                                              | ~                                                                                        | ~                                                                                  | 0.255                                                      | U                                                          | 0.0200                                                    | U                                                         | 0.0195                                                     | U                                                          |
| Total PCBs                                             | 0.1                                                            | 1                                                                                        | 3.2                                                                                | 7.930                                                      | D                                                          | 0.438                                                     |                                                           | 0.0195                                                     | U                                                          |
| PFAS, NYSDEC Target List                               |                                                                |                                                                                          |                                                                                    |                                                            |                                                            |                                                           |                                                           |                                                            |                                                            |
| Dilution Factor                                        |                                                                |                                                                                          |                                                                                    |                                                            |                                                            |                                                           |                                                           |                                                            | ug/Kg                                                      |
| 1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FT)      | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 1                                                          |
| 1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FT)      | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| N-EtFOSAA                                              | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| N-MeFOSAA                                              | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluoro-1-decanesulfonic acid (PFDS)                 | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluoro-1-heptanesulfonic acid (PFHpS)               | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluoro-1-octanesulfonamide (FOSA)                   | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorobutanesulfonic acid (PFBS)                    | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorodecanoic acid (PFDA)                          | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorododecanoic acid (PFDoA)                       | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorooctadecanoic acid (PFODa)                     | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorohexanesulfonic acid (PFHxS)                   | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorohexanoic acid (PFHxA)                         | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluoro-n-butyanoic acid (PFBA)                      | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorononanoic acid (PFNA)                          | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorooctanesulfonic acid (PFOS)                    | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorooctanoic acid (PFOA)                          | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluoropentanoic acid (PFPeA)                        | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorotetradecanoic acid (PFTA)                     | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluorotridecanoic acid (PFTTrDA)                    | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |
| Perfluoroundecanoic acid (PFUnA)                       | ~                                                              | ~                                                                                        | ~                                                                                  | NT                                                         |                                                            | NT                                                        |                                                           | NT                                                         | 0.298                                                      |

**NOTES:**

Any Regulatory Exceedences are color coded by Regulation

**Q is the Qualifier Column with definitions as follows:**

D=result is from an analysis that required a dilution

I=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

B=analyte found in the analysis batch blank

E=result is estimated and cannot be accurately reported due to levels encountered or interferences

P=this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

NT=this indicates the analyte was not a target for this sample

~=this indicates that no regulatory limit has been established for this analyte

**Table 10**  
**Volatile Organic Compounds in Groundwater**  
**Clay Street, Brooklyn NY**

| Sample ID                                         | NYSDEC TOGS Standards and Guidance Values - GA | GW-1<br>2380854-01<br>Clay St.<br>Water | GW-2<br>2380854-03<br>Clay St.<br>Water | GW-3<br>2380854-02<br>Clay St.<br>Water | GW-X<br>2380854-04<br>Clay St.<br>Water | GW-4<br>2380727-09<br>Commercial St.<br>Water | GW-5<br>2380727-08<br>Commercial St.<br>Water | S-FB-1<br>2380854-05<br>Water | GW-FB-1<br>2380854-06<br>Water |
|---------------------------------------------------|------------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------|--------------------------------|
| Client Matrix                                     | Compound                                       | Result                                  | Q                                       | Result                                  | Q                                       | Result                                        | Q                                             | Result                        | Q                              |
| VOA, 1260 LOW MASTER                              | ug/L                                           | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| Dilution Factor                                   | 200                                            | 1                                       |                                         | 1                                       |                                         | 1                                             |                                               | 1                             |                                |
| 1,1,1,2-Tetrachloroethane                         | 5                                              | 0.216                                   | U                                       | 0.216                                   | U                                       | 0.216                                         | U                                             | 0.216                         | U                              |
| 1,1,1-Trichloroethane                             | 5                                              | 0.266                                   | U                                       | 0.266                                   | U                                       | 0.266                                         | U                                             | 0.266                         | U                              |
| 1,1,2,2-Tetrachloroethane                         | 5                                              | 0.256                                   | U                                       | 0.256                                   | U                                       | 0.256                                         | U                                             | 0.256                         | U                              |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | 5                                              | 0.850                                   | U                                       | 0.286                                   | U                                       | 0.286                                         | U                                             | 0.286                         | U                              |
| 1,1,2-Trichloroethane                             | 1                                              | 1.380                                   |                                         | 0.249                                   | U                                       | 0.249                                         | U                                             | 0.249                         | U                              |
| 1,1-Dichloroethane                                | 5                                              | 0.650                                   |                                         | 0.272                                   | U                                       | 0.272                                         | U                                             | 0.272                         | U                              |
| 1,1-Dichloroethylene                              | 5                                              | 11.200                                  |                                         | 0.327                                   | U                                       | 0.327                                         | U                                             | 0.327                         | U                              |
| 1,2,3-Trichlorobenzene                            | 5                                              | 0.222                                   | U                                       | 0.222                                   | U                                       | 0.222                                         | U                                             | 0.222                         | U                              |
| 1,2,3-Trichloropropane                            | 0.04                                           | 0.273                                   | U                                       | 0.273                                   | U                                       | 0.273                                         | U                                             | 0.273                         | U                              |
| 1,2,4-Trichlorobenzene                            | 5                                              | 0.138                                   | U                                       | 0.138                                   | U                                       | 0.138                                         | U                                             | 0.138                         | U                              |
| 1,2,4-Trimethylbenzene                            | 5                                              | 0.370                                   | J                                       | 0.310                                   | U                                       | 0.310                                         | U                                             | 0.310                         | U                              |
| 1,2-Dibromo-3-chloropropane                       | 0.04                                           | 0.432                                   | U                                       | 0.432                                   | U                                       | 0.432                                         | U                                             | 0.432                         | U                              |
| 1,2-Dibromoethane                                 | 0.0006                                         | 0.215                                   | U                                       | 0.215                                   | U                                       | 0.215                                         | U                                             | 0.215                         | U                              |
| 1,2-Dichlorobenzene                               | 3                                              | 0.270                                   | U                                       | 0.270                                   | U                                       | 0.270                                         | U                                             | 0.270                         | U                              |
| 1,2-Dichloroethane                                | 0.6                                            | 0.510                                   | U                                       | 0.377                                   | U                                       | 0.377                                         | U                                             | 0.377                         | U                              |
| 1,2-Dichloropropane                               | 1                                              | 0.327                                   | U                                       | 0.327                                   | U                                       | 0.327                                         | U                                             | 0.327                         | U                              |
| 1,3,5-Trimethylbenzene                            | 5                                              | 0.347                                   | U                                       | 0.347                                   | U                                       | 0.347                                         | U                                             | 0.347                         | U                              |
| 1,3-Dichlorobenzene                               | 3                                              | 0.283                                   | U                                       | 0.283                                   | U                                       | 0.283                                         | U                                             | 0.283                         | U                              |
| 1,3-Dichloropropane                               | 5                                              | 0.260                                   | U                                       | 0.260                                   | U                                       | 0.260                                         | U                                             | 0.260                         | U                              |
| 1,4-Dichlorobenzene                               | 3                                              | 0.311                                   | U                                       | 0.311                                   | U                                       | 0.311                                         | U                                             | 0.311                         | U                              |
| 1,4-Dioxane                                       | ~                                              | 35.300                                  | U                                       | 35.300                                  | U                                       | 35.300                                        | U                                             | 35.300                        | U                              |
| 2-Butanone                                        | 50                                             | 0.421                                   | U                                       | 0.421                                   | U                                       | 0.421                                         | U                                             | 0.421                         | U                              |
| 2-Hexanone                                        | 50                                             | 0.320                                   | U                                       | 0.320                                   | U                                       | 0.320                                         | U                                             | 0.320                         | U                              |
| 4-Methyl-2-pentanone                              | ~                                              | 0.365                                   | U                                       | 0.365                                   | U                                       | 0.365                                         | U                                             | 0.365                         | U                              |
| Acetone                                           | 50                                             | 1.340                                   | U                                       | 1.340                                   | U                                       | 1.340                                         | U                                             | 1.340                         | U                              |
| Acrolein                                          | ~                                              | 0.447                                   | U                                       | 0.447                                   | U                                       | 0.447                                         | U                                             | 0.447                         | U                              |
| Acrylonitrile                                     | ~                                              | 0.422                                   | U                                       | 0.422                                   | U                                       | 0.422                                         | U                                             | 0.422                         | U                              |
| Benzene                                           | 5                                              | 0.279                                   | U                                       | 0.279                                   | U                                       | 0.279                                         | U                                             | 0.279                         | U                              |
| Bromochloromethane                                | 5                                              | 0.354                                   | U                                       | 0.354                                   | U                                       | 0.354                                         | U                                             | 0.354                         | U                              |
| Bromodichloromethane                              | 50                                             | 0.950                                   | U                                       | 0.245                                   | U                                       | 0.245                                         | U                                             | 0.245                         | U                              |
| Bromoform                                         | 50                                             | 0.163                                   | U                                       | 0.163                                   | U                                       | 0.163                                         | U                                             | 0.163                         | U                              |
| Bromomethane                                      | 5                                              | 0.119                                   | U                                       | 0.119                                   | U                                       | 0.119                                         | U                                             | 0.119                         | U                              |
| Carbon disulfide                                  | ~                                              | 0.362                                   | U                                       | 0.362                                   | U                                       | 0.362                                         | U                                             | 0.362                         | U                              |
| Carbon tetrachloride                              | 5                                              | 0.204                                   | U                                       | 0.204                                   | U                                       | 0.204                                         | U                                             | 0.204                         | U                              |
| Chlorobenzene                                     | 5                                              | 0.284                                   | U                                       | 0.284                                   | U                                       | 0.284                                         | U                                             | 0.284                         | U                              |
| Chloroethane                                      | 5                                              | 0.448                                   | U                                       | 0.448                                   | U                                       | 0.448                                         | U                                             | 0.448                         | U                              |
| Chloroform                                        | 7                                              | 12                                      | U                                       | 0.370                                   | J                                       | 0.370                                         | J                                             | 0.243                         | U                              |
| Chloromethane                                     | 5                                              | 0.372                                   | U                                       | 0.372                                   | U                                       | 0.372                                         | U                                             | 0.372                         | U                              |
| cis-1,2-Dichloroethylene                          | 5                                              | 1.340                                   | D                                       | 0.330                                   | J                                       | 1.580                                         |                                               | 1.990                         |                                |
| cis-1,3-Dichloropropylene                         | 0.4                                            | 0.262                                   | U                                       | 0.262                                   | U                                       | 0.262                                         | U                                             | 0.262                         | U                              |
| Cyclohexane                                       | ~                                              | 0.491                                   | U                                       | 0.491                                   | U                                       | 0.491                                         | U                                             | 0.491                         | U                              |
| Dibromochloromethane                              | 50                                             | 0.146                                   | U                                       | 0.146                                   | U                                       | 0.146                                         | U                                             | 0.146                         | U                              |
| Dibromomethane                                    | ~                                              | 0.203                                   | U                                       | 0.203                                   | U                                       | 0.203                                         | U                                             | 0.203                         | U                              |
| Dichlorodifluoromethane                           | 5                                              | 0.451                                   | U                                       | 0.451                                   | U                                       | 0.451                                         | U                                             | 0.451                         | U                              |
| Ethyl Benzene                                     | 5                                              | 0.290                                   | U                                       | 0.290                                   | U                                       | 0.290                                         | U                                             | 0.290                         | U                              |
| Hexachlorobutadiene                               | 0.5                                            | 0.241                                   | U                                       | 0.241                                   | U                                       | 0.241                                         | U                                             | 0.241                         | U                              |
| Isopropylbenzene                                  | 5                                              | 0.405                                   | U                                       | 0.405                                   | U                                       | 0.405                                         | U                                             | 0.405                         | U                              |
| Methyl acetate                                    | ~                                              | 0.442                                   | U                                       | 0.442                                   | U                                       | 0.442                                         | U                                             | 0.442                         | U                              |
| Methyl tert-butyl ether (MTBE)                    | 10                                             | 0.244                                   | U                                       | 0.244                                   | U                                       | 2.350                                         |                                               | 0.244                         | J                              |
| Methylcyclohexane                                 | ~                                              | 0.477                                   | U                                       | 0.477                                   | U                                       | 0.477                                         | U                                             | 0.477                         | U                              |
| Methylene chloride                                | 5                                              | 0.397                                   | U                                       | 0.397                                   | U                                       | 0.397                                         | U                                             | 0.397                         | U                              |
| Naphthalene                                       | 10                                             | 0.560                                   | J                                       | 0.590                                   | J                                       | 0.212                                         | U                                             | 0.212                         | U                              |
| n-Butylbenzene                                    | 5                                              | 0.399                                   | U                                       | 0.399                                   | U                                       | 0.399                                         | U                                             | 0.399                         | U                              |
| n-Propylbenzene                                   | 5                                              | 0.384                                   | U                                       | 0.384                                   | U                                       | 0.384                                         | U                                             | 0.384                         | U                              |
| o-Xylene                                          | 5                                              | 0.261                                   | U                                       | 0.261                                   | U                                       | 0.261                                         | U                                             | 0.261                         | U                              |
| p- & m- Xylenes                                   | ~                                              | 0.578                                   | U                                       | 0.578                                   | U                                       | 0.578                                         | U                                             | 0.578                         | U                              |
| p-Diethylbenzene                                  | ~                                              | 0.341                                   | U                                       | 0.341                                   | U                                       | 0.341                                         | U                                             | 0.341                         | U                              |
| p-Ethyltoluene                                    | ~                                              | 0.200                                   | U                                       | 0.200                                   | U                                       | 0.200                                         | U                                             | 0.200                         | U                              |
| p-Isopropyltoluene                                | 5                                              | 0.377                                   | U                                       | 0.377                                   | U                                       | 0.377                                         | U                                             | 0.377                         | U                              |
| sec-Butylbenzene                                  | 5                                              | 0.444                                   | U                                       | 0.444                                   | U                                       | 0.444                                         | U                                             | 0.444                         | U                              |
| Styrene                                           | 5                                              | 0.255                                   | U                                       | 0.255                                   | U                                       | 0.255                                         | U                                             | 0.255                         | U                              |
| tert-Butyl alcohol (TBA)                          | ~                                              | 0.608                                   | U                                       | 0.608                                   | U                                       | 0.608                                         | U                                             | 0.608                         | U                              |
| tert-Butylbenzene                                 | 5                                              | 0.367                                   | U                                       | 0.367                                   | U                                       | 0.367                                         | U                                             | 0.367                         | U                              |
| Tetrachloroethylene                               | 5                                              | 6.280                                   |                                         | 0.239                                   | U                                       | 0.239                                         | U                                             | 0.239                         | U                              |
| Toluene                                           | 5                                              | 0.346                                   | U                                       | 0.346                                   | U                                       | 0.346                                         | U                                             | 0.346                         | U                              |
| trans-1,2-Dichloroethylene                        | 5                                              | 42.600                                  |                                         | 0.279                                   | U                                       | 0.279                                         | U                                             | 0.279                         | U                              |
| trans-1,3-Dichloropropylene                       | 0.4                                            | 0.229                                   | U                                       | 0.229                                   | U                                       | 0.229                                         | U                                             | 0.229                         | U                              |
| Trichloroethylene                                 | 5                                              | 6.370                                   | D                                       | 1.300                                   |                                         | 15.200                                        |                                               | 11.200                        |                                |
| Trichlorofluoromethane                            | 5                                              | 0.337                                   | U                                       | 0.337                                   | U                                       | 0.337                                         | U                                             | 0.337                         | U                              |
| Vinyl Chloride                                    | 2                                              | 30.400                                  |                                         | 0.469                                   | U                                       | 0.469                                         | U                                             | 0.469                         | U                              |
| Xylenes, Total                                    | 5                                              | 0.836                                   | U                                       | 0.836                                   | U                                       | 0.836                                         | U                                             | 0.836                         | U                              |

**NOTES:**  
Any Regulatory Exceedences are color coded by Regulation  
**Q** is the Qualifier Column with definitions as follows:  
D=Result is from an analysis that required a dilution  
J=Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated  
U=Analyte not detected at or above the level indicated  
~=Analyte found in the analysis batch blank  
E=Result is estimated and cannot be accurately reported due to levels encountered or interferences  
P=This flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis  
NT=This indicates the analyte was not a target for this sample  
~=This indicates that no regulatory limit has been established for this analyte

| Table 11<br>Semi-Volatile Organic Compounds in Groundwater<br>Clay Street, Brooklyn NY |                                                      |                                         |                                         |                                         |                                         |                                              |                                              |                      |   |        |    |        |   |        |   |        |   |
|----------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|----------------------------------------------|----------------------------------------------|----------------------|---|--------|----|--------|---|--------|---|--------|---|
| Sample ID<br>York ID<br>Sampling Location<br>Client Matrix                             | NYSDCE TOGS<br>Standards and<br>Guidance Values - GA | GW-1<br>2380854-01<br>Clay St.<br>Water | GW-2<br>2380854-03<br>Clay St.<br>Water | GW-3<br>2380854-02<br>Clay St.<br>Water | GW-4<br>2380854-04<br>Clay St.<br>Water | GW-5<br>2380727-08<br>Commercial St<br>Water | GW-6<br>2380854-05<br>Commercial St<br>Water | S-FB-1<br>2380854-06 |   |        |    |        |   |        |   |        |   |
| Compound                                                                               |                                                      | Result                                  | Q                                       | Result                                  | Q                                       | Result                                       | Q                                            | Result               | Q | Result | Q  | Result | Q | Result | Q | Result | Q |
| Semi-Volatiles, 1,4-Dioxane B270 SIM-Aqueous                                           |                                                      | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                         |                                              | ug/L                 |   | ug/L   |    | ug/L   |   | ug/L   |   | ug/L   |   |
| Dilution Factor                                                                        | ~                                                    | 1                                       |                                         | 1                                       |                                         | 1                                            |                                              | 1                    |   | 1      |    | 1      |   | 1      |   | 1      |   |
| 1,4-Dioxane                                                                            |                                                      | 1.230                                   |                                         | 0.300                                   | U                                       | 0.300                                        | U                                            | 0.300                | U | NT     |    | 0.300  | U | 0.300  | U | 0.300  | U |
| SVOA, B270 LOW MASTER                                                                  |                                                      | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                         |                                              | ug/L                 |   | ug/L   |    | ug/L   |   | ug/L   |   | ug/L   |   |
| Dilution Factor                                                                        | ~                                                    | 1                                       |                                         | 1                                       |                                         | 1                                            |                                              | 1                    |   | 1      |    | 1      |   | 1      |   | 1      |   |
| 1,1-Biphenyl                                                                           | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 1,2,4,5-Tetrachlorobenzene                                                             | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 1,2,4-Trichlorobenzene                                                                 | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 1,2-Dichlorobenzene                                                                    | 3                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 1,2-Diphenylhydrazine (as Azobenzene)                                                  | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 1,3-Dichlorobenzene                                                                    | 3                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 1,4-Dichlorobenzene                                                                    | 3                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,3,4,6-Tetrachlorophenol                                                              | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,4,5-Trichlorophenol                                                                  | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,4,6-Trichlorophenol                                                                  | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,4-Dichlorophenol                                                                     | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,4-Dimethylphenol                                                                     | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,4-Dinitrophenol                                                                      | 10                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,4-Dinitrotoluene                                                                     | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2,6-Dinitrotoluene                                                                     | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2-Chloronaphthalene                                                                    | 10                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2-Chlorophenol                                                                         | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2-Methylnaphthalene                                                                    | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2-Methylphenol                                                                         | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2-Nitroaniline                                                                         | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 2-Nitrophenol                                                                          | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 3- & 4-Methylphenols                                                                   | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 3,3-Dichlorobenzidine                                                                  | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 3-Nitroaniline                                                                         | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4,6-Dinitro-2-methylphenol                                                             | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4-Bromophenyl phenyl ether                                                             | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4-Chloro-3-methylphenol                                                                | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4-Chloroaniline                                                                        | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4-Chlorophenyl phenyl ether                                                            | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4-Nitroaniline                                                                         | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| 4-Nitrophenol                                                                          | 1                                                    | 5.410                                   | U                                       | 5.880                                   | U                                       | 5.260                                        | U                                            | 5.410                | U | 5.410  | U  | 5.260  | U | 6.670  | U | 9.090  | U |
| Acetophenone                                                                           | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Alpha Terpineol                                                                        | ~                                                    | 5.410                                   | U                                       | 5.880                                   | U                                       | 5.260                                        | U                                            | 5.410                | U | 5.410  | U  | 5.260  | U | 6.670  | U | 9.090  | U |
| Aniline                                                                                | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Benzaldehyde                                                                           | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Benzidine                                                                              | ~                                                    | 5.410                                   | U                                       | 5.880                                   | U                                       | 5.260                                        | U                                            | 5.410                | U | 5.410  | U  | 5.260  | U | 6.670  | U | 9.090  | U |
| Benzoic acid                                                                           | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Benzyl alcohol                                                                         | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Benzyl butyl phthalate                                                                 | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Bis(2-chloroethoxy)methane                                                             | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Bis(2-chloroethyl)ether                                                                | 1                                                    | 1.080                                   | U                                       | 1.180                                   | U                                       | 1.050                                        | U                                            | 1.080                | U | 1.080  | U  | 1.050  | U | 1.330  | U | 1.820  | U |
| Bis(2-chloroisopropyl)ether                                                            | 5                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Caprolactam                                                                            | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Carbazole                                                                              | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Dibenzofuran                                                                           | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Diethyl phthalate                                                                      | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Dimethyl phthalate                                                                     | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Di-n-butyl phthalate                                                                   | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Di-n-octyl phthalate                                                                   | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Hexachlorocyclopentadiene                                                              | 5                                                    | 5.410                                   | U                                       | 5.880                                   | U                                       | 5.260                                        | U                                            | 5.410                | U | 5.410  | U  | 5.260  | U | 6.670  | U | 9.090  | U |
| Isophorone                                                                             | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| N-nitroso-di-n-propylamine                                                             | ~                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| N-Nitrosodiphenylamine                                                                 | 50                                                   | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| Phenol                                                                                 | 1                                                    | 2.700                                   | U                                       | 2.940                                   | U                                       | 2.630                                        | U                                            | 2.700                | U | 2.700  | U  | 2.630  | U | 3.330  | U | 4.550  | U |
| SVOA, B270 SIM MASTER                                                                  |                                                      | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                         |                                              | ug/L                 |   | ug/L   |    | ug/L   |   | ug/L   |   | ug/L   |   |
| Dilution Factor                                                                        | 1                                                    |                                         |                                         | 20                                      |                                         | 1                                            |                                              | 2                    |   | 1      |    | 1      |   | 1      |   | 1      |   |
| Acenaphthene                                                                           | 20                                                   | 0.0541                                  | U                                       | 1.880                                   |                                         | 0.0526                                       | U                                            | 0.0541               | U | 0.195  |    | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Acenaphthylene                                                                         | ~                                                    | 0.0541                                  | U                                       | 1.720                                   |                                         | 0.0526                                       | U                                            | 0.0541               | U | 0.0973 |    | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Anthracene                                                                             | 50                                                   | 0.0541                                  | U                                       | 15.100                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0865 |    | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Atrazine                                                                               | ~                                                    | 0.541                                   | U                                       | 0.588                                   | U                                       | 0.526                                        | U                                            | 0.541                | U | 0.541  | U  | 0.526  | U | 0.667  | U | 0.909  | U |
| Benzo(a)anthracene                                                                     | 0.002                                                | 0.0541                                  | U                                       | 47.100                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Benzo(a)pyrene                                                                         | 0.002                                                | 0.0541                                  | U                                       | 46.400                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Benzo(b)fluoranthene                                                                   | 0.002                                                | 0.0541                                  | U                                       | 36.200                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Benzo(g,h,i)perylene                                                                   | ~                                                    | 0.0541                                  | U                                       | 34.400                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Benzo(k)fluoranthene                                                                   | 0.002                                                | 0.0541                                  | U                                       | 39.800                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Bis(2-ethylhexyl)phthalate                                                             | 5                                                    | 0.984                                   | U                                       | 0.953                                   |                                         | 0.526                                        | U                                            | 0.0541               | U | 4.710  | BD | 0.747  | B | 0.667  | U | 1.110  | U |
| Chrysene                                                                               | 0.002                                                | 0.0541                                  | U                                       | 45.900                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Dibenz(a,h)anthracene                                                                  | 0.0541                                               | 0.0541                                  | U                                       | 4.780                                   |                                         | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Fluoranthene                                                                           | 50                                                   | 0.0541                                  | U                                       | 109                                     | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Fluorene                                                                               | 50                                                   | 0.0541                                  | U                                       | 2.220                                   |                                         | 0.0526                                       | U                                            | 0.0541               | U | 0.173  |    | 0.0526 | U | 0.413  |   | 0.709  |   |
| Hexachlorobenzene                                                                      | 0.04                                                 | 0.0216                                  | U                                       | 0.0235                                  | U                                       | 0.0211                                       | U                                            | 0.0216               | U | 0.0216 | U  | 0.0211 | U | 0.0267 | U | 0.0364 | U |
| Hexachlorobutadiene                                                                    | 0.5                                                  | 0.541                                   | U                                       | 0.588                                   | U                                       | 0.526                                        | U                                            | 0.541                | U | 0.541  | U  | 0.526  | U | 0.667  | U | 0.909  | U |
| Hexachloroethene                                                                       | 5                                                    | 0.541                                   | U                                       | 0.588                                   | U                                       | 0.526                                        | U                                            | 0.541                | U | 0.541  | U  | 0.526  | U | 0.667  | U | 0.909  | U |
| Indeno(1,2,3-cd)pyrene                                                                 | 0.002                                                | 0.0541                                  | U                                       | 31.300                                  | D                                       | 0.0526                                       | U                                            | 0.0541               | U | 0.0541 | U  | 0.0526 | U | 0.0667 | U | 0.0909 | U |
| Naphthalene                                                                            | 10                                                   | 0.0541                                  | U                                       | 1.410                                   |                                         | 0.0526                                       | U                                            | 0.0541               | U | 0.346  |    | 0.0842 | U | 0.0667 | U | 0.0    |   |

**Table 12**  
**Inorganic Constituents in Groundwater**  
**Clay Street, Brooklyn NY**

| Sample ID<br>York ID<br>Sampling Location<br>Client Matrix | NYSDEC TOGS<br>Standards and<br>Guidance Values - GA | GW-1<br>2380854-01<br>Clay St.<br>Water | GW-2<br>2380854-03<br>Clay St.<br>Water | GW-3<br>2380854-02<br>Clay St.<br>Water | GW-X<br>2380854-04<br>Clay St.<br>Water | GW-5<br>2380727-08<br>Commercial St.<br>Water | GW-4<br>2380727-09<br>Commercial St.<br>Water | S-FB-1<br>2380854-05<br>Water | GW-FB-1<br>2380854-06<br>Water |
|------------------------------------------------------------|------------------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------|--------------------------------|
| Compound                                                   |                                                      | Result                                  | Q                                       | Result                                  | Q                                       | Result                                        | Q                                             | Result                        | Q                              |
| <b>Metals, Target Analyte, ICP</b>                         | ug/L                                                 | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| <b>Dilution Factor</b>                                     |                                                      | 1                                       |                                         | 2                                       |                                         | 1                                             |                                               | 1                             |                                |
| Aluminum                                                   | ~                                                    | 94.200                                  |                                         | 64,600                                  |                                         | 456                                           |                                               | 2,220                         |                                |
| Barium                                                     | 1000                                                 | 61,700                                  |                                         | 423                                     |                                         | 98,800                                        |                                               | 62,500                        |                                |
| Calcium                                                    | ~                                                    | 107,000                                 | B                                       | 274,000                                 | B                                       | 203,000                                       | B                                             | 45,900                        | B                              |
| Chromium                                                   | 50                                                   | 5,560                                   | U                                       | 165                                     | U                                       | 5,560                                         | U                                             | 12,500                        | U                              |
| Cobalt                                                     | ~                                                    | 4,440                                   | U                                       | 90,800                                  |                                         | 4,440                                         | U                                             | 10                            | U                              |
| Copper                                                     | 200                                                  | 22,200                                  | U                                       | 319                                     | U                                       | 22,200                                        | U                                             | 50                            | U                              |
| Iron                                                       | ~                                                    | 278                                     | U                                       | 155,000                                 | D                                       | 437                                           |                                               | 6,140                         | U                              |
| Lead                                                       | 25                                                   | 5,560                                   | U                                       | 159                                     | U                                       | 5,560                                         | U                                             | 75,400                        | U                              |
| Magnesium                                                  | 35000                                                | 31,100                                  |                                         | 60,500                                  |                                         | 40,300                                        |                                               | 5,730                         |                                |
| Manganese                                                  | 300                                                  | 586                                     |                                         | 3,700                                   |                                         | 1,080                                         |                                               | 660                           |                                |
| Nickel                                                     | 100                                                  | 11,100                                  | U                                       | 168                                     | U                                       | 11,100                                        | U                                             | 31,500                        | U                              |
| Potassium                                                  | ~                                                    | 7,730                                   |                                         | 41,900                                  |                                         | 5,040                                         |                                               | 16,300                        |                                |
| Silver                                                     | 50                                                   | 5,560                                   | U                                       | 5,560                                   | U                                       | 5,560                                         | U                                             | 12,500                        | U                              |
| Sodium                                                     | 20000                                                | 124,000                                 |                                         | 93,400                                  |                                         | 189,000                                       |                                               | 13,900                        |                                |
| Vanadium                                                   | ~                                                    | 11,100                                  | U                                       | 217                                     |                                         | 11,100                                        | U                                             | 23,900                        | U                              |
| Zinc                                                       | 2000                                                 | 27,800                                  | U                                       | 535                                     |                                         | 27,800                                        | U                                             | 197                           |                                |
| <b>Metals, Target Analyte, ICP Dissolved</b>               | ug/L                                                 | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| <b>Dilution Factor</b>                                     |                                                      | 1                                       |                                         | 1                                       |                                         | 1                                             |                                               | 1                             |                                |
| Aluminum                                                   | ~                                                    | 124                                     |                                         | 7,850                                   |                                         | 196                                           |                                               | 1,740                         |                                |
| Barium                                                     | 1000                                                 | 68,300                                  |                                         | 71,300                                  |                                         | 106                                           |                                               | 237                           |                                |
| Calcium                                                    | ~                                                    | 107,000                                 | B                                       | 275,000                                 | B                                       | 202,000                                       | B                                             | 68,200                        | B                              |
| Chromium                                                   | 50                                                   | 5,560                                   | U                                       | 17,500                                  | U                                       | 5,560                                         | U                                             | 16,700                        | U                              |
| Cobalt                                                     | ~                                                    | 4,440                                   | U                                       | 42,200                                  | U                                       | 4,440                                         | U                                             | 4,440                         | U                              |
| Copper                                                     | 200                                                  | 22,200                                  | U                                       | 230                                     | U                                       | 22,200                                        | U                                             | 50                            | U                              |
| Iron                                                       | ~                                                    | 278                                     | U                                       | 17,800                                  |                                         | 356                                           |                                               | 23,800                        |                                |
| Lead                                                       | 25                                                   | 6,800                                   |                                         | 86,600                                  |                                         | 5,560                                         | U                                             | 69                            |                                |
| Magnesium                                                  | 35000                                                | 33,500                                  |                                         | 39,000                                  |                                         | 41,900                                        |                                               | 5,240                         |                                |
| Manganese                                                  | 300                                                  | 638                                     |                                         | 3,180                                   |                                         | 1,150                                         |                                               | 700                           |                                |
| Nickel                                                     | 100                                                  | 11,100                                  | U                                       | 52,200                                  | U                                       | 11,100                                        | U                                             | 26                            | U                              |
| Potassium                                                  | ~                                                    | 8,670                                   |                                         | 30,100                                  |                                         | 5,150                                         |                                               | 16,000                        |                                |
| Silver                                                     | 50                                                   | 5,560                                   | U                                       | 5,560                                   | U                                       | 5,560                                         | U                                             | 12,500                        | U                              |
| Sodium                                                     | 20000                                                | 126,000                                 |                                         | 94,200                                  |                                         | 196,000                                       |                                               | 14,700                        |                                |
| Vanadium                                                   | ~                                                    | 11,100                                  | U                                       | 47,500                                  |                                         | 11,100                                        | U                                             | 25                            | U                              |
| Zinc                                                       | 2000                                                 | 51,900                                  |                                         | 193                                     |                                         | 27,800                                        | U                                             | 200                           |                                |
| <b>Metals, Target Analyte, ICPMS</b>                       | ug/L                                                 | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| <b>Dilution Factor</b>                                     |                                                      | 1                                       |                                         | 1                                       |                                         | 1                                             |                                               | 1                             |                                |
| Antimony                                                   | 3                                                    | 1.110                                   | U                                       | 1.110                                   | U                                       | 1.110                                         | U                                             | 2                             | U                              |
| Arsenic                                                    | 25                                                   | 1.110                                   | U                                       | 7,540                                   |                                         | 1.110                                         | U                                             | 9,230                         |                                |
| Beryllium                                                  | 3                                                    | 0.333                                   | U                                       | 1,240                                   | U                                       | 0.333                                         | U                                             | 0.642                         | U                              |
| Cadmium                                                    | 5                                                    | 0.556                                   | U                                       | 0.821                                   | U                                       | 0.556                                         | U                                             | 1                             | U                              |
| Selenium                                                   | 10                                                   | 4,840                                   |                                         | 47,600                                  |                                         | 17,300                                        |                                               | 2                             |                                |
| Thallium                                                   | ~                                                    | 1.110                                   | U                                       | 1.110                                   | U                                       | 1.110                                         | U                                             | 2                             | U                              |
| <b>Metals, Target Analyte, ICPMS Dissolved</b>             | ug/L                                                 | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| <b>Dilution Factor</b>                                     |                                                      | 1                                       |                                         | 1                                       |                                         | 1                                             |                                               | 1                             |                                |
| Antimony                                                   | 3                                                    | 1.110                                   | U                                       | 1.110                                   | U                                       | 1.110                                         | U                                             | 1                             | U                              |
| Arsenic                                                    | 25                                                   | 1.110                                   | U                                       | 2,110                                   | U                                       | 1.110                                         | U                                             | 2,300                         | U                              |
| Beryllium                                                  | 3                                                    | 0.333                                   | U                                       | 0.769                                   | U                                       | 0.333                                         | U                                             | 0.600                         | U                              |
| Cadmium                                                    | 5                                                    | 0.556                                   | U                                       | 0.591                                   | U                                       | 0.556                                         | U                                             | 1                             | U                              |
| Selenium                                                   | 10                                                   | 6,470                                   |                                         | 29                                      |                                         | 16,100                                        |                                               | 2                             |                                |
| Thallium                                                   | ~                                                    | 1.110                                   | U                                       | 1.110                                   | U                                       | 1.110                                         | U                                             | 2                             | U                              |
| <b>Mercury by 7470/7471</b>                                | ug/L                                                 | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| <b>Dilution Factor</b>                                     |                                                      | 1                                       |                                         | 1                                       |                                         | 1                                             |                                               | 1                             |                                |
| Mercury                                                    | 0.7                                                  | 0.200                                   | U                                       | 0.400                                   |                                         | 0.200                                         | U                                             | 0.200                         | U                              |
| <b>Mercury, Dissolved</b>                                  | ug/L                                                 | ug/L                                    |                                         | ug/L                                    |                                         | ug/L                                          |                                               | ug/L                          |                                |
| <b>Dilution Factor</b>                                     |                                                      | 1                                       |                                         | 1                                       |                                         | 1                                             |                                               | 1                             |                                |
| Mercury                                                    | 0.7                                                  | 0.200                                   | U                                       | 0.200                                   | U                                       | 0.200                                         | U                                             | 0.200                         | U                              |

NOTES:  
Any Regulatory Exceedences are color coded by Regulation

Q is the Qualifier Column with definitions as follows:

D= result is from an analysis that required a dilution

J= analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimate

U= analyte not detected at or above the level indicated

B= analyte found in the analysis batch blank

E= result is estimated and cannot be accurately reported due to levels encountered or interferences

P= this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

NT= this indicates the analyte was not a target for this sample

~= this indicates that no regulatory limit has been established for this analyte

Table 13  
PCB, Pest and PFAS in Groundwater  
Clay Street, Brooklyn NY

| Sample ID                                          | NYSED TOGS           | GW-1       | GW-2       | GW-3       | GW-4       | GW-5           | GW-6           | GW-7       | GW-8       | S-FB-1  | GW-FB-1 |
|----------------------------------------------------|----------------------|------------|------------|------------|------------|----------------|----------------|------------|------------|---------|---------|
| York ID                                            | Standards and        | 2380854-01 | 2380854-03 | 2380854-02 | 2380854-04 | 2380727-08     | 2380727-09     | 2380854-05 | 2380854-06 |         |         |
| Sampling Location                                  | Guidance Values - GA | Clay St.   | Clay St.   | Clay St.   | Clay St.   | Commercial St. | Commercial St. | Water      | Water      | Water   | Water   |
| Client Matrix                                      |                      | Result     | Result     | Result     | Result     | Result         | Result         | Result     | Result     | Result  | Result  |
| Compound                                           |                      | Q          | Q          | Q          | Q          | Q              | Q              | Q          | Q          | Q       | Q       |
| PEST, 8081 MASTER                                  | ug/L                 | ug/L       | ug/L       | ug/L       | ug/L       | ug/L           | ug/L           | ug/L       | ug/L       | ug/L    | ug/L    |
| Dilution Factor                                    | 1                    | 1          | 1          | 1          | 1          | 1              | 1              | 1          | 1          | 1       | 1       |
| 4,4'-DDD                                           | 0.3                  | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| 4,4'-DDE                                           | 0.2                  | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| 4,4'-DDT                                           | 0.3                  | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Aldrin                                             | ~                    | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| alpha-BHC                                          | 0.01                 | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| alpha-Chlordane                                    | ~                    | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| beta-BHC                                           | 0.04                 | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Chlordane, total                                   | 0.05                 | 0.211      | U          | 0.242      | U          | 0.222          | U              | 0.216      | U          | 0.211   | U       |
| deta-BHC                                           | 0.04                 | 0.00421    | U          | 0.00779    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| deta-BHC [ZC]                                      | ~                    | 0.00421    | U          | 0.00779    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Dieldrin                                           | 0.004                | 0.00211    | U          | 0.00222    | U          | 0.00211        | U              | 0.00216    | U          | 0.00211 | U       |
| Endosulfan I                                       | ~                    | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Endosulfan II                                      | ~                    | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Endosulfan sulfate                                 | ~                    | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Endrin                                             | ~                    | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Endrin aldehyde                                    | 5                    | 0.0105     | U          | 0.0121     | U          | 0.0111         | U              | 0.0108     | U          | 0.0105  | U       |
| Endrin ketone                                      | 5                    | 0.0105     | U          | 0.0121     | U          | 0.0111         | U              | 0.0108     | U          | 0.0105  | U       |
| gamma-BHC (Lindane)                                | 0.05                 | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| gamma-Chlordane                                    | ~                    | 0.0105     | U          | 0.0121     | U          | 0.0111         | U              | 0.0105     | U          | 0.0105  | U       |
| Heptachlor                                         | 0.04                 | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Heptachlor epoxide                                 | 0.03                 | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| Methoxychlor                                       | 35                   | 0.00421    | U          | 0.00485    | U          | 0.00444        | U              | 0.00432    | U          | 0.00421 | U       |
| oxyphen                                            | 0.06                 | 0.0121     | U          | 0.111      | U          | 0.108          | U              | 0.105      | U          | 0.105   | U       |
| PCB, 8082 MASTER                                   | ug/L                 | ug/L       | ug/L       | ug/L       | ug/L       | ug/L           | ug/L           | ug/L       | ug/L       | ug/L    | ug/L    |
| Dilution Factor                                    | 1                    | 1          | 1          | 1          | 1          | 1              | 1              | 1          | 1          | 1       | 1       |
| Aroclor 1016                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1221                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1232                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1242                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1248                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1254                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1260                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1262                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Aroclor 1268                                       | ~                    | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| Total PCBs                                         | 0.09                 | 0.0526     | U          | 0.0606     | U          | 0.0556         | U              | 0.0541     | U          | 0.0526  | U       |
| PFAS, NYSED Target List                            |                      |            |            |            |            |                |                |            |            |         |         |
| Dilution Factor                                    | 5                    | 5          | 5          | 5          | 5          | 5              | 5              | 5          | 5          | 5       | 5       |
| 1H,1H,2H,2H-Perfluorooctanesulfonic acid (8:2 FTS) | ~                    | 0.00500    | U          | 0.00500    | U          | 0.00481        | U              | NT         | NT         | 0.00463 | U       |
| 1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS) | ~                    | 0.0125     | U          | 0.0248     | U          | 0.0120         | U              | NT         | NT         | 0.00231 | U       |
| N-EtFOSEA                                          | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| N-MeFOSEA                                          | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluoro-1-decanesulfonic acid (PFDS)             | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluoro-1-heptanesulfonic acid (PFHpS)           | ~                    | 0.00105    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluoro-1-octanesulfonamide (FOSA)               | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluorobutanesulfonic acid (PFBS)                | ~                    | 0.00414    | U          | 0.00415    | U          | 0.0197         | U              | NT         | NT         | 0.00664 | U       |
| Perfluorodecanoic acid (PFDA)                      | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluorododecanoic acid (PFDoA)                   | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluorooctanoic acid (PFHxA)                     | ~                    | 0.0113     | U          | 0.0333     | U          | 0.0303         | U              | NT         | NT         | 0.0225  | U       |
| Perfluorohexanesulfonic acid (PFHxS)               | ~                    | 0.00381    | U          | 0.00168    | U          | 0.0195         | U              | NT         | NT         | 0.00171 | U       |
| Perfluorohexanoic acid (PFHxA)                     | ~                    | 0.0103     | U          | 0.00588    | U          | 0.0317         | U              | NT         | NT         | 0.00993 | U       |
| Perfluoro-n-butanoic acid (PFBA)                   | ~                    | 0.00690    | U          | 0.00439    | U          | 0.0243         | U              | NT         | NT         | 0.0107  | U       |
| Perfluorononanoic acid (PFNA)                      | ~                    | 0.00170    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.0172  | U       |
| Perfluorooctanesulfonic acid (PFOS)                | ~                    | 0.0187     | U          | 0.0182     | U          | 0.00703        | U              | NT         | NT         | 0.0118  | U       |
| Perfluorooctanoic acid (PFDA)                      | ~                    | 0.0884     | U          | 0.00920    | U          | 0.111          | U              | NT         | NT         | 0.0747  | U       |
| Perfluoropentanoic acid (PFPeA)                    | ~                    | 0.00916    | U          | 0.00505    | U          | 0.0316         | U              | NT         | NT         | 0.00562 | U       |
| Perfluorotetradecanoic acid (PFTA)                 | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluoroundecanoic acid (PFUdA)                   | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |
| Perfluoroundecanoic acid (PFUdA)                   | ~                    | 0.00100    | U          | 0.00100    | U          | 0.00096        | U              | NT         | NT         | 0.00093 | U       |

**NOTES:**  
Any Regulatory Exceedences are color coded by Regulation

**Q is the Qualifier Column with definitions as follows:**  
D=Result is from an analysis that required a dilution  
H=Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimator  
U=Analyte not detected at or above the level indicated  
B=Analyte found in the analysis batch blank  
E=Result is estimated and cannot be accurately reported due to levels encountered or interferences  
P=This flag is used for pesticide and PCB (Aroclor) target compounds when there is a difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis  
NT=This indicates the analyte was not a target for this sample  
-This indicates that no regulatory limit has been established for this analyte

| Table 14<br>Soil Vapor Samples<br>Clay Street, Brooklyn |  |                                |                            |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                                   |   |                                                   |   |                                                    |   |                                                    |      |
|---------------------------------------------------------|--|--------------------------------|----------------------------|----------------------------------------------|---|----------------------------------------------|---|----------------------------------------------|---|----------------------------------------------|---|----------------------------------------------|---|----------------------------------------------|---|----------------------------------------------|---|---------------------------------------------------|---|---------------------------------------------------|---|----------------------------------------------------|---|----------------------------------------------------|------|
| Sample ID                                               |  |                                |                            | OA-1<br>Clay Street<br>2/14/2023 12:43:00 PM |   | SV-1<br>Clay Street<br>2/14/2023 12:07:00 PM |   | SV-2<br>Clay Street<br>2/14/2023 12:05:00 PM |   | SV-3<br>Clay Street<br>2/14/2023 12:10:00 PM |   | SV-4<br>Clay Street<br>2/14/2023 11:14:00 AM |   | SV-5<br>Clay Street<br>2/14/2023 11:25:00 AM |   | SV-6<br>Clay Street<br>2/14/2023 11:20:00 AM |   | OA-2<br>Commercial Street<br>2/14/2023 1:10:00 PM |   | SV-7<br>Commercial Street<br>2/14/2023 1:01:00 PM |   | SV-8<br>Commercial Street<br>2/14/2023 12:09:00 PM |   | SV-9<br>Commercial Street<br>2/14/2023 12:00:00 PM |      |
| Sample Location                                         |  | NYSDOH Immediate Action Levels | NYSDOH Air Guidance Values | Outdoor Ambient Air                          |   | Soil Vapor                                   |   | Soil Vapor                                   |   | Soil Vapor                                   |   | Soil Vapor                                   |   | Soil Vapor                                   |   | Soil Vapor                                   |   | Outdoor Ambient Air                               |   | Soil Vapor                                        |   | Soil Vapor                                         |   | Soil Vapor                                         |      |
| Sampling Date                                           |  |                                |                            |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                                   |   |                                                   |   |                                                    |   |                                                    |      |
| Client Matrix                                           |  |                                |                            |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                              |   |                                                   |   |                                                   |   |                                                    |   |                                                    |      |
| Compound                                                |  |                                |                            | Result                                       | Q | Result                                       | Q | Result                                       | Q | Result                                       | Q | Result                                       | Q | Result                                       | Q | Result                                       | Q | Result                                            | Q | Result                                            | Q | Result                                             | Q | Result                                             | Q    |
| Volatile Organics, EPA TO15 Full List                   |  | ug/m3                          |                            | ug/m3                                        |   | ug/m3                                        |   | ug/m3                                        |   | ug/m3                                        |   | ug/m3                                        |   | ug/m3                                        |   | ug/m3                                        |   | ug/m3                                             |   | ug/m3                                             |   | ug/m3                                              |   | ug/m3                                              |      |
| Dilution Factor                                         |  |                                |                            | 0.814                                        |   | 562.8                                        |   | 5.404                                        |   | 10746.7                                      |   | 328.2                                        |   | 1.447                                        |   | 7.06                                         |   | 31.08                                             |   | 6.064                                             |   | 31.08                                              |   | 6.064                                              |      |
| 1,1,1,2-Tetrachloroethane                               |  | 100                            |                            | 0.560                                        | U | 9.700                                        | U | 3.700                                        | U | 20                                           | U | 11                                           | U | 11                                           | U | 0.990                                        | U | 0.500                                             | U | 4.800                                             | U | 11                                                 | U | 4.200                                              | U    |
| 1,1,1-Trichloroethane                                   |  |                                |                            | 0.440                                        | U | 54                                           | D | 10                                           | D | 200                                          | D | 9                                            | D | 9.800                                        | D | 3.900                                        | D | 0.390                                             | U | 3.900                                             | U | 8.500                                              | U | 3.300                                              | U    |
| 1,1,2,2-Tetrachloroethane                               |  |                                |                            | 0.560                                        | U | 9.700                                        | U | 3.700                                        | U | 20                                           | U | 11                                           | U | 11                                           | U | 0.990                                        | U | 0.500                                             | U | 4.800                                             | U | 11                                                 | U | 4.200                                              | U    |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)       |  |                                |                            | 0.620                                        | U | 11                                           | U | 4.100                                        | U | 22                                           | U | 13                                           | U | 12                                           | U | 1.100                                        | U | 0.550                                             | U | 5.400                                             | U | 12                                                 | U | 4.600                                              | U    |
| 1,1,2-Trichloroethane                                   |  |                                |                            | 0.440                                        | U | 7.700                                        | U | 2.900                                        | U | 16                                           | U | 9                                            | U | 8.900                                        | U | 0.790                                        | U | 0.390                                             | U | 3.900                                             | U | 8.500                                              | U | 3.300                                              | U    |
| 1,1-Dichloroethane                                      |  |                                |                            | 0.330                                        | U | 5.700                                        | U | 2.200                                        | U | 12                                           | U | 6.600                                        | U | 6.600                                        | U | 0.590                                        | U | 0.290                                             | U | 2.900                                             | U | 6.300                                              | U | 2.500                                              | U    |
| 1,1-Dichloroethylene                                    |  | 6                              |                            | 0.0810                                       | U | 1.400                                        | U | 0.540                                        | U | 2.900                                        | U | 1.600                                        | U | 1.600                                        | U | 0.140                                        | U | 0.0720                                            | U | 0.700                                             | U | 1.500                                              | U | 0.600                                              | U    |
| 1,2,4-Trichlorobenzene                                  |  |                                |                            | 0.600                                        | U | 10                                           | U | 4                                            | U | 22                                           | U | 12                                           | U | 12                                           | U | 1.100                                        | U | 0.540                                             | U | 5.200                                             | U | 12                                                 | U | 4.500                                              | U    |
| 1,2,4-Trimethylbenzene                                  |  |                                |                            | 0.400                                        | U | 6.900                                        | U | 2.700                                        | U | 14                                           | U | 8.100                                        | U | 8                                            | U | 0.780                                        | D | 0.350                                             | U | 3.500                                             | U | 7.600                                              | U | 3                                                  | U    |
| 1,2-Dibromoethane                                       |  |                                |                            | 0.630                                        | U | 11                                           | U | 4.200                                        | U | 22                                           | U | 13                                           | U | 13                                           | U | 1.100                                        | U | 0.550                                             | U | 5.400                                             | U | 12                                                 | U | 4.700                                              | U    |
| 1,2-Dichlorobenzene                                     |  |                                |                            | 0.490                                        | U | 8.500                                        | U | 3.200                                        | U | 18                                           | U | 9.900                                        | U | 9.800                                        | U | 0.870                                        | U | 0.430                                             | U | 4.200                                             | U | 9.300                                              | U | 3.600                                              | U    |
| 1,2-Dichloroethane                                      |  |                                |                            | 0.330                                        | U | 5.700                                        | U | 2.200                                        | U | 12                                           | U | 6.600                                        | U | 6.600                                        | U | 0.590                                        | U | 0.290                                             | U | 2.900                                             | U | 6.300                                              | U | 2.500                                              | U    |
| 1,2-Dichloropropane                                     |  |                                |                            | 0.380                                        | U | 6.500                                        | U | 2.500                                        | U | 13                                           | U | 7.600                                        | U | 7.500                                        | U | 0.670                                        | U | 0.330                                             | U | 3.300                                             | U | 7.200                                              | U | 2.800                                              | U    |
| 1,2-Dichlorotetrafluoroethane                           |  |                                |                            | 0.570                                        | U | 9.800                                        | U | 3.800                                        | U | 20                                           | U | 11                                           | U | 11                                           | U | 0.500                                        | U | 0.250                                             | U | 4.900                                             | U | 11                                                 | U | 4.200                                              | U    |
| 1,3,5-Trimethylbenzene                                  |  |                                |                            | 0.400                                        | U | 6.900                                        | U | 2.700                                        | U | 14                                           | U | 8.100                                        | U | 8                                            | U | 0.710                                        | U | 0.350                                             | U | 3.500                                             | U | 7.600                                              | U | 3                                                  | U    |
| 1,3-Butadiene                                           |  |                                |                            | 0.540                                        | U | 9.300                                        | U | 3.600                                        | U | 19                                           | U | 11                                           | U | 11                                           | U | 0.960                                        | U | 0.480                                             | U | 4.700                                             | U | 10                                                 | U | 7.800                                              | D    |
| 1,3-Dichlorobenzene                                     |  |                                |                            | 0.490                                        | U | 8.500                                        | U | 3.200                                        | U | 18                                           | U | 9.900                                        | U | 9.800                                        | U | 0.870                                        | U | 0.430                                             | U | 4.200                                             | U | 9.300                                              | U | 3.600                                              | U    |
| 1,3-Dichloropropane                                     |  |                                |                            | 0.380                                        | U | 6.500                                        | U | 2.500                                        | U | 13                                           | U | 7.600                                        | U | 7.500                                        | U | 0.670                                        | U | 0.330                                             | U | 3.300                                             | U | 7.200                                              | U | 2.800                                              | U    |
| 1,4-Dichlorobenzene                                     |  |                                |                            | 0.490                                        | U | 8.500                                        | U | 3.200                                        | U | 18                                           | U | 9.900                                        | U | 9.800                                        | U | 0.870                                        | U | 0.430                                             | U | 4.200                                             | U | 9.300                                              | U | 3.600                                              | U    |
| 1,4-Dioxane                                             |  |                                |                            | 0.590                                        | U | 10                                           | U | 3.900                                        | U | 21                                           | U | 12                                           | U | 12                                           | U | 1                                            | U | 0.520                                             | U | 5.100                                             | U | 11                                                 | U | 4.400                                              | U    |
| 2-Butanone                                              |  |                                |                            | 0.820                                        | D | 4.100                                        | U | 1.900                                        | D | 8.600                                        | U | 4.800                                        | U | 4.800                                        | U | 0.430                                        | U | 0.870                                             | D | 11                                                | D | 4.600                                              | U | 1.800                                              | U    |
| 2-Hexanone                                              |  |                                |                            | 0.670                                        | U | 12                                           | U | 4.400                                        | U | 24                                           | U | 13                                           | U | 13                                           | U | 1.200                                        | U | 0.590                                             | U | 5.800                                             | U | 13                                                 | U | 5                                                  | U    |
| 3-Chloropropene                                         |  |                                |                            | 1.300                                        | U | 22                                           | U | 8.500                                        | U | 46                                           | U | 26                                           | U | 25                                           | U | 2.300                                        | U | 1.100                                             | U | 11                                                | U | 24                                                 | U | 9.500                                              | U    |
| 4-Methyl-2-pentanone                                    |  |                                |                            | 0.330                                        | U | 5.800                                        | U | 2.200                                        | U | 12                                           | U | 6.700                                        | U | 6.700                                        | U | 0.590                                        | U | 0.300                                             | U | 2.900                                             | U | 6.400                                              | U | 2.500                                              | U    |
| Acetone                                                 |  |                                |                            | 3.700                                        | D | 42                                           | D | 36                                           | D | 330                                          | D | 74                                           | D | 180                                          | D | 99                                           | D | 46                                                | D | 8.900                                             | D | 130                                                | D | 29                                                 | D    |
| Acrylonitrile                                           |  |                                |                            | 0.180                                        | U | 3.100                                        | U | 1.200                                        | U | 6.300                                        | U | 3.600                                        | U | 3.500                                        | U | 0.310                                        | U | 0.160                                             | U | 1.500                                             | U | 3.400                                              | U | 1.200                                              | U    |
| Benzene                                                 |  |                                |                            | 0.310                                        | D | 4.500                                        | U | 1.700                                        | U | 9.300                                        | U | 5.200                                        | U | 5.200                                        | U | 0.460                                        | U | 0.280                                             | D | 2.500                                             | D | 5                                                  | U | 1.900                                              | U    |
| Benzyl chloride                                         |  |                                |                            | 0.420                                        | U | 7.300                                        | U | 2.800                                        | U | 15                                           | U | 8.500                                        | U | 8.400                                        | U | 0.750                                        | U | 0.370                                             | U | 3.700                                             | U | 8                                                  | U | 3.100                                              | U    |
| Bromodichloromethane                                    |  |                                |                            | 0.550                                        | U | 9.400                                        | U | 3.600                                        | U | 20                                           | U | 11                                           | U | 11                                           | U | 0.970                                        | U | 0.480                                             | U | 4.700                                             | U | 10                                                 | U | 4.100                                              | U    |
| Bromoform                                               |  |                                |                            | 0.840                                        | U | 15                                           | U | 5.600                                        | U | 30                                           | U | 17                                           | U | 17                                           | U | 1.500                                        | U | 0.750                                             | U | 7.300                                             | U | 16                                                 | U | 6.300                                              | U    |
| Bromomethane                                            |  |                                |                            | 0.320                                        | U | 5.500                                        | U | 2.100                                        | U | 11                                           | U | 6.400                                        | U | 6.300                                        | U | 0.560                                        | U | 0.280                                             | U | 2.700                                             | U | 6                                                  | U | 2.400                                              | U    |
| Carbon disulfide                                        |  |                                |                            | 0.250                                        | U | 4.400                                        | U | 1.700                                        | U | 9.100                                        | U | 5.100                                        | U | 5.100                                        | U | 0.450                                        | U | 0.220                                             | U | 30                                                | D | 4.800                                              | U | 13                                                 | D    |
| Carbon tetrachloride                                    |  | 6                              |                            | 0.360                                        | D | 2.200                                        | U | 0.850                                        | D | 9.200                                        | D | 2.600                                        | U | 2.600                                        | U | 0.360                                        | D | 0.360                                             | D | 1.100                                             | D | 27                                                 | D | 1.500                                              | D    |
| Chlorobenzene                                           |  |                                |                            | 0.370                                        | U | 6.500                                        | U | 2.500                                        | U | 13                                           | U | 7.600                                        | U | 7.500                                        | U | 0.670                                        | U | 0.330                                             | U | 3.300                                             | U | 7.200                                              | U | 2.800                                              | U    |
| Chloroethane                                            |  |                                |                            | 0.210                                        | U | 3.700                                        | U | 1.400                                        | U | 7.700                                        | U | 4.300                                        | U | 4.300                                        | U | 0.380                                        | U | 0.190                                             | U | 1.900                                             | U | 4.100                                              | U | 1.600                                              | U    |
| Chloroform                                              |  |                                |                            | 0.400                                        | U | 38                                           | D | 5                                            | D | 300                                          | D | 62                                           | D | 15                                           | D | 0.710                                        | D | 0.350                                             | U | 3.400                                             | U | 52                                                 | D | 3.300                                              | D    |
| Chloromethane                                           |  |                                |                            | 1.300                                        | D | 2.900                                        | U | 1.100                                        | U | 6                                            | U | 3.400                                        | U | 3.400                                        | U | 0.300                                        | U | 1.100                                             | D | 1.500                                             | U | 3.200                                              | U | 1.300                                              | U    |
| cis-1,2-Dichloroethylene                                |  | 6                              |                            | 0.0810                                       | U | 8.900                                        | D | 7.100                                        | D | 120                                          | D | 7.800                                        | D | 4.500                                        | D | 0.140                                        | U | 0.0720                                            | U | 0.700                                             | U | 2.500                                              | D | 0.600                                              | U    |
| cis-1,3-Dichloropropylene                               |  |                                |                            | 0.370                                        | U | 6.400                                        | U | 2.500                                        | U | 13                                           | U | 7.400                                        | U | 7.400                                        | U | 0.660                                        | U | 0.330                                             | U | 3.200                                             | U | 7.100                                              | U | 2.800                                              | U    |
| Cyclohexane                                             |  |                                |                            | 0.280                                        | U | 17                                           | D | 1.900                                        | U | 10                                           | U | 5.600                                        | U | 5.600                                        | U | 0.500                                        | U | 0.250                                             | U | 8                                                 | D | 23                                                 | U | 2                                                  | U    |
| Dibromodichloromethane                                  |  |                                |                            | 0.690                                        | U | 12                                           | U | 4.600                                        | U | 25                                           | U | 14                                           | U | 14                                           | U | 1.200                                        | U | 0.620                                             | U | 6                                                 | U | 13                                                 | U | 5.200                                              | U    |
| Dichlorodifluoromethane                                 |  |                                |                            | 2.400                                        | D | 7                                            | U | 2.700                                        | U | 14                                           | U | 8.100                                        | U | 8.100                                        | U | 2.900                                        | D | 2.500                                             | D | 3.500                                             | U | 7.700                                              | U | 3                                                  | U    |
| Ethyl acetate                                           |  |                                |                            | 0.590                                        | U | 10                                           | U | 3.900                                        | U | 21                                           | U | 12                                           | U | 12                                           | U | 1                                            | U | 0.520                                             | U | 5.100                                             | U | 11                                                 | U | 4.400                                              | U    |
| Ethyl Benzene                                           |  |                                |                            | 0.350                                        | U | 6.100                                        | U | 2.300                                        | U | 13                                           | U | 7.100                                        | U | 7.100                                        | U | 0.630                                        | D | 0.310                                             | U | 10                                                | D | 6.700                                              | U | 6.100                                              | D    |
| Hexachlorobutadiene                                     |  |                                |                            | 0.870                                        | U | 15                                           | U | 5.800                                        | U | 31                                           | U | 18                                           | U | 17                                           | U | 1.500                                        | U | 0.770                                             | U | 7.500                                             | U | 17                                                 | U | 6.500                                              | U    |
| Isopropanol                                             |  |                                |                            | 2                                            | D | 19                                           | D | 2.700                                        | U | 14                                           | U | 8.100                                        | U | 8                                            | U | 6.600                                        | D | 1.800                                             | D | 5.200                                             | D | 7.600                                              | U | 3                                                  | U    |
| Methyl Methacrylate                                     |  |                                |                            | 0.330                                        | U | 5.800                                        | U | 2.200                                        | U | 12                                           | U | 6.700                                        | U | 6.700                                        | U | 0.590                                        | U | 0.300                                             | U | 2.900                                             | U | 6.400                                              | U | 2.500                                              | U    |
| Methyl tert-butyl ether (MTBE)                          |  |                                |                            | 0.290                                        | U | 5.100                                        | U | 1.900                                        | U | 11                                           | U | 5.900                                        | U | 5.900                                        | U | 0.520                                        | U | 0.260                                             | U | 2.500                                             | U | 5.600                                              | U | 2.200                                              | U    |
| Methylene chloride                                      |  |                                | 60                         | 0.760                                        | D | 9.800                                        | U | 3.800                                        | U | 20                                           | U | 11                                           | U | 11                                           | U | 0.490                                        | U | 0.700                                             | D | 4.900                                             | U | 11                                                 | U | 4.200                                              | U></ |

Table 15  
Volatile Organic Compounds in Soil Samples

19-27 Clay Street, Brooklyn NY

| Sample ID                                         | SB-11 (1-3 R)        | SB-11 (6-8 R)        | SB-12 (0-2 R)         | SB-12 (5-7 R)         | SB-13 (0-2 R)         | SB-13 (4-6 R)         | SB-14 (0-2 R)         | SB-14 (5-7 R)         |         |   |
|---------------------------------------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------|---|
| Work ID                                           | 23E0798-01           | 23E0798-02           | 23E0798-03            | 23E0798-04            | 23E0798-05            | 23E0798-06            | 23E0798-07            | 23E0798-08            |         |   |
| Sampling Date                                     | 5/12/2023 9:42:00 AM | 5/12/2023 9:45:00 AM | 5/12/2023 10:14:00 AM | 5/12/2023 10:47:00 AM | 5/12/2023 10:52:00 AM | 5/12/2023 10:55:00 AM | 5/12/2023 11:24:00 AM | 5/12/2023 11:28:00 AM |         |   |
| Client Matrix                                     | Soil                 | Soil                 | Soil                  | Soil                  | Soil                  | Soil                  | Soil                  | Soil                  |         |   |
| Compound                                          | Result               | Q                    | Result                | Q                     | Result                | Q                     | Result                | Q                     |         |   |
| mg/Kg                                             | mg/Kg                |                      | mg/Kg                 |                       | mg/Kg                 |                       | mg/Kg                 |                       |         |   |
| VOA, B260 MASTER                                  | 1                    |                      | 1                     |                       | 1                     |                       | 1                     |                       |         |   |
| 1,1,1,2-Tetrachloroethane                         | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 0.68                                              | 100                  | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,1,1-Trichloroethane                             | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,1,2,2-Tetrachloroethane                         | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,1,2-Trichloroethane                             | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,1-Dichloroethane                                | 0.27                 | 19                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,1-Dichloroethylene                              | 0.33                 | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| ~                                                 | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2-Dichloropropane                               | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2,3-Trichlorobenzene                            | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2,3-Trichloropropane                            | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2,4,5-Tetramethylbenzene                        | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2,4-Trichlorobenzene                            | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2,4-Trimethylbenzene                            | 3.6                  | 47                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,2-Dibromo-3-chloropropane                       | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2-Dibromobenzene                                | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,2-Dichlorobenzene                               | 1.1                  | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,2-Dichloroethane                                | 0.02                 | 2.3                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,2-Dichloropropane                               | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,3,5-Trimethylbenzene                            | 8.4                  | 47                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,3-Dichlorobenzene                               | 2.4                  | 17                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,3-Dichloropropane                               | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 1,4-Dichlorobenzene                               | 1.8                  | 9.8                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 1,4-Dioxane                                       | 0.1                  | 9.8                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 2,2-Dichloropropane                               | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 2-Butanone                                        | 0.12                 | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| 2-Chloroethylvinyl ether                          | ~                    | 0.0140               | U                     | 0.00930               | U                     | 0.0100                | U                     | 0.00840               | U       |   |
| 2-Chlorotoluene                                   | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 2-Hexanone                                        | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 4-Chlorotoluene                                   | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| 4-Methyl-2-pentanone                              | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Acetone                                           | 0.05                 | 100                  | 0.00700               | U                     | 0.00470               | U                     | 0.00420               | U                     | 0.00560 | J |
| Aroclor                                           | ~                    | 0.00700              | U                     | 0.00470               | U                     | 0.00520               | U                     | 0.00420               | U       |   |
| Acrylonitrile                                     | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Benzene                                           | 0.06                 | 2.9                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Bromobenzene                                      | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Bromochloromethane                                | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Bromodichloromethane                              | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Bromoforn                                         | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Bromomethane                                      | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Carbon disulfide                                  | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Carbon tetrachloride                              | 0.76                 | 1.4                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Chlorobenzene                                     | 1.1                  | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Chloroethane                                      | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Chloroform                                        | 0.37                 | 10                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.0110  | U |
| Chloromethane                                     | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| cs-1,2-Dichloroethylene                           | 0.25                 | 59                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| cs-1,3-Dichloropropylene                          | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Cyclohexane                                       | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Dibromochloromethane                              | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Dibromomethane                                    | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Dichlorodifluoromethane                           | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Diisopropyl ether (DIPe)                          | ~                    | 0.00560              | U                     | 0.00370               | U                     | 0.00420               | U                     | 0.00450               | U       |   |
| Ethanol                                           | ~                    | 0.0560               | U                     | 0.0370                | U                     | 0.0420                | U                     | 0.0450                | U       |   |
| Ethyl Benzene                                     | 1                    | 30                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Ethyl tert-butyl ether (ETBE)                     | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Hexachlorobutadiene                               | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Iodomethane                                       | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Isopropylbenzene                                  | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Methyl acetate                                    | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Methyl Methacrylate                               | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Methyl tert-butyl ether (MTBE)                    | 0.93                 | 62                   | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Methyldichloroethane                              | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Methylenedichloride                               | 0.05                 | 51                   | 0.00700               | U                     | 0.00470               | U                     | 0.00420               | U                     | 0.00560 | J |
| Naphthalene                                       | 12                   | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| n-Butylbenzene                                    | 12                   | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| n-Propylbenzene                                   | 3.9                  | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| p-Xylene                                          | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| p- & m- Xylenes                                   | ~                    | 0.00700              | U                     | 0.00470               | U                     | 0.00520               | U                     | 0.00420               | U       |   |
| p-Diethylbenzene                                  | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| p-Ethyltoluene                                    | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| p-Isopropyltoluene                                | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| sec-Butylbenzene                                  | 11                   | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Styrene                                           | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| tert-Amyl alcohol (TAA)                           | ~                    | 0.0560               | U                     | 0.0370                | U                     | 0.0420                | U                     | 0.0450                | U       |   |
| tert-Amyl methyl ether (TAME)                     | ~                    | 0.00560              | U                     | 0.00370               | U                     | 0.00420               | U                     | 0.00450               | U       |   |
| tert-Butyl alcohol (TBA)                          | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| tert-Butylbenzene                                 | 5.9                  | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Tetrachloroethylene                               | 1.3                  | 5.5                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Tetrahydrofuran                                   | ~                    | 0.00700              | U                     | 0.00470               | U                     | 0.00520               | U                     | 0.00420               | U       |   |
| Toluene                                           | 0.0730               | ~                    | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| trans-1,2-Dichloroethylene                        | 0.19                 | 100                  | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| trans-1,3-Dichloropropylene                       | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| trans-1,4-dichloro-2-butene                       | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Trichloroethylene                                 | 0.47                 | 10                   | 0.740                 | E                     | 0.00720               | U                     | 0.370                 | E                     | 0.0250  | U |
| Trichlorofluoromethane                            | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Vinyl acetate                                     | ~                    | 0.00350              | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210               | U       |   |
| Vinyl Chloride                                    | 0.02                 | 0.21                 | 0.00350               | U                     | 0.00230               | U                     | 0.00260               | U                     | 0.00210 | U |
| Xylenes, Total                                    | 0.26                 | 100                  | 0.0100                | U                     | 0.00700               | U                     | 0.00700               | U                     | 0.00940 | U |

|                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;">Table 16</p> <p style="text-align: center;">19 Clay Street, Brooklyn NY</p> <p style="text-align: center;">Volatile Organic Compounds In Groundwater</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Sample ID                                         |        | GW-6                 |   | GW-7                  |   | GW-8                  |   |
|---------------------------------------------------|--------|----------------------|---|-----------------------|---|-----------------------|---|
| York ID                                           |        | 23E0792-01           |   | 23E0792-02            |   | 23E0792-03            |   |
| Sampling Date                                     |        | 5/12/2023 9:48:00 AM |   | 5/12/2023 10:20:00 AM |   | 5/12/2023 10:57:00 AM |   |
| Client Matrix                                     |        | Water                |   | Water                 |   | Water                 |   |
| Compound                                          |        | Result               | Q | Result                | Q | Result                | Q |
| VOA, 8260 LOW MASTER                              | ug/L   | ug/L                 |   | ug/L                  |   | ug/L                  |   |
| Dilution Factor                                   |        | 1                    |   | 1                     |   | 1                     |   |
| 1,1,1,2-Tetrachloroethane                         | 5      | 0.216                | U | 0.216                 | U | 0.216                 | U |
| 1,1,1-Trichloroethane                             | 5      | 0.920                |   | 0.520                 |   | 0.266                 | U |
| 1,1,2,2-Tetrachloroethane                         | 5      | 0.256                | U | 0.256                 | U | 0.256                 | U |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | 5      | 0.286                | U | 0.286                 | U | 0.286                 | U |
| 1,1,2-Trichloroethane                             | 1      | 0.249                | U | 0.249                 | U | 0.249                 | U |
| 1,1-Dichloroethane                                | 5      | 0.420                | J | 0.380                 | J | 0.272                 | U |
| 1,1-Dichloroethylene                              | 5      | 0.327                | U | 0.327                 | U | 0.327                 | U |
| 1,2,3-Trichlorobenzene                            | 5      | 0.222                | U | 0.222                 | U | 0.222                 | U |
| 1,2,3-Trichloropropane                            | 0.04   | 0.273                | U | 0.273                 | U | 0.273                 | U |
| 1,2,4-Trichlorobenzene                            | 5      | 0.138                | U | 0.138                 | U | 0.138                 | U |
| 1,2,4-Trimethylbenzene                            | 5      | 0.310                | U | 0.310                 | U | 0.310                 | U |
| 1,2-Dibromo-3-chloropropane                       | 0.04   | 0.432                | U | 0.432                 | U | 0.432                 | U |
| 1,2-Dibromoethane                                 | 0.0006 | 0.215                | U | 0.215                 | U | 0.215                 | U |
| 1,2-Dichlorobenzene                               | 3      | 0.270                | U | 0.270                 | U | 0.270                 | U |
| 1,2-Dichloroethane                                | 0.6    | 0.377                | U | 0.377                 | U | 0.377                 | U |
| 1,2-Dichloropropane                               | 1      | 0.327                | U | 0.327                 | U | 0.327                 | U |
| 1,3,5-Trimethylbenzene                            | 5      | 0.347                | U | 0.347                 | U | 0.347                 | U |
| 1,3-Dichlorobenzene                               | 3      | 0.283                | U | 0.283                 | U | 0.283                 | U |
| 1,3-Dichloropropane                               | 5      | 0.260                | U | 0.260                 | U | 0.260                 | U |
| 1,4-Dichlorobenzene                               | 3      | 0.311                | U | 0.311                 | U | 0.311                 | U |
| 1,4-Dioxane                                       | 0.35   | 35.300               | U | 35.300                | U | 35.300                | U |
| 2-Butanone                                        | 50     | 0.421                | U | 0.690                 |   | 0.870                 |   |
| 2-Hexanone                                        | 50     | 0.320                | U | 0.320                 | U | 0.320                 | U |
| 4-Methyl-2-pentanone                              | ~      | 0.365                | U | 0.365                 | U | 0.365                 | U |
| Acetone                                           | 50     | 3.080                |   | 15.700                |   | 9.030                 |   |
| Acrolein                                          | ~      | 0.447                | U | 0.447                 | U | 0.447                 | U |
| Acrylonitrile                                     | ~      | 0.422                | U | 0.422                 | U | 0.422                 | U |
| Benzene                                           | 1      | 0.279                | U | 0.279                 | U | 0.279                 | U |
| Bromochloromethane                                | 5      | 0.354                | U | 0.354                 | U | 0.354                 | U |
| Bromodichloromethane                              | 50     | 0.245                | U | 0.245                 | U | 0.245                 | U |
| Bromoform                                         | 50     | 0.163                | U | 0.163                 | U | 0.163                 | U |
| Bromomethane                                      | 5      | 0.119                | U | 0.119                 | U | 0.119                 | U |
| Carbon disulfide                                  | ~      | 0.362                | U | 0.362                 | U | 0.362                 | U |
| Carbon tetrachloride                              | 5      | 0.204                | U | 0.204                 | U | 0.204                 | U |
| Chlorobenzene                                     | 5      | 0.284                | U | 0.284                 | U | 0.284                 | U |
| Chloroethane                                      | 5      | 0.448                | U | 0.448                 | U | 0.448                 | U |
| Chloroform                                        | 7      | 1.740                |   | 4.060                 |   | 0.400                 | J |
| Chloromethane                                     | 5      | 0.372                | U | 0.372                 | U | 0.372                 | U |
| cis-1,2-Dichloroethylene                          | 5      | 0.294                | U | 0.410                 | J | 0.294                 | U |
| cis-1,3-Dichloropropylene                         | 0.4    | 0.262                | U | 0.262                 | U | 0.262                 | U |
| Cyclohexane                                       | ~      | 0.491                | U | 0.491                 | U | 0.491                 | U |
| Dibromochloromethane                              | 50     | 0.146                | U | 0.146                 | U | 0.146                 | U |
| Dibromomethane                                    | ~      | 0.203                | U | 0.203                 | U | 0.203                 | U |
| Dichlorodifluoromethane                           | 5      | 0.451                | U | 0.451                 | U | 0.451                 | U |
| Ethyl Benzene                                     | 5      | 0.290                | U | 0.290                 | U | 0.290                 | U |
| Hexachlorobutadiene                               | 0.5    | 0.241                | U | 0.241                 | U | 0.241                 | U |
| Isopropylbenzene                                  | 5      | 0.405                | U | 0.405                 | U | 0.405                 | U |
| Methyl acetate                                    | ~      | 0.442                | U | 0.442                 | U | 0.442                 | U |
| Methyl tert-butyl ether (MTBE)                    | 10     | 0.244                | U | 0.244                 | U | 0.244                 | U |
| Methylcyclohexane                                 | ~      | 0.477                | U | 0.477                 | U | 0.477                 | U |
| Methylene chloride                                | 5      | 0.397                | U | 0.397                 | U | 0.397                 | U |
| Naphthalene                                       | 10     | 0.212                | U | 2.480                 |   | 0.410                 | J |
| n-Butylbenzene                                    | 5      | 0.399                | U | 0.399                 | U | 0.399                 | U |
| n-Propylbenzene                                   | 5      | 0.384                | U | 0.384                 | U | 0.384                 | U |
| o-Xylene                                          | 5      | 0.261                | U | 0.261                 | U | 0.261                 | U |
| p- & m- Xylenes                                   | ~      | 0.578                | U | 0.578                 | U | 0.578                 | U |
| p-Diethylbenzene                                  | ~      | 0.341                | U | 0.341                 | U | 0.341                 | U |
| p-Ethyltoluene                                    | ~      | 0.200                | U | 0.200                 | U | 0.200                 | U |
| p-Isopropyltoluene                                | 5      | 0.377                | U | 0.377                 | U | 0.377                 | U |
| sec-Butylbenzene                                  | 5      | 0.444                | U | 0.444                 | U | 0.444                 | U |
| Styrene                                           | 5      | 0.255                | U | 0.255                 | U | 0.255                 | U |
| tert-Butyl alcohol (TBA)                          | ~      | 0.608                | U | 0.608                 | U | 0.608                 | U |
| tert-Butylbenzene                                 | 5      | 0.367                | U | 0.367                 | U | 0.367                 | U |
| Tetrachloroethylene                               | 5      | 0.270                | J | 0.710                 |   | 0.239                 | U |
| Toluene                                           | 5      | 0.346                | U | 0.346                 | U | 0.346                 | U |
| trans-1,2-Dichloroethylene                        | 5      | 0.279                | U | 0.279                 | U | 0.279                 | U |
| trans-1,3-Dichloropropylene                       | 0.4    | 0.229                | U | 0.229                 | U | 0.229                 | U |
| Trichloroethylene                                 | 5      | 86.600               |   | 142                   |   | 19.400                |   |
| Trichlorofluoromethane                            | 5      | 0.337                | U | 0.337                 | U | 0.337                 | U |
| Vinyl Chloride                                    | 2      | 0.469                | U | 0.469                 | U | 0.469                 | U |
| Xylenes, Total                                    | 5      | 0.836                | U | 0.836                 | U | 0.836                 | U |

NOTES:

Any Regulatory Exceedences are color coded by Regulation

Q is the Qualifier Column with definitions as follows:

D=result is from an analysis that required a dilution

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated

B=analyte found in the analysis batch blank

E= result is estimated and cannot be accurately reported due to levels encountered or interferences

P=this flag is used for pesticide and PCB (Aroclor) target compounds when there is a % difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis

NT=this indicates the analyte was not a target for this sample

~=this indicates that no regulatory limit has been established for this analyte



| Table 17                                          |                       |   |                       |   |
|---------------------------------------------------|-----------------------|---|-----------------------|---|
| 19-27 Clay Street Brooklyn NY                     |                       |   |                       |   |
| Volatile Organic Compounds in Soil Vapor Samples  |                       |   |                       |   |
| Sample ID                                         | SV-10                 |   | SV-11                 |   |
| York ID                                           | 23E0786-01            |   | 23E0786-02            |   |
| Sampling Date                                     | 5/12/2023 10:34:00 AM |   | 5/12/2023 10:40:00 AM |   |
| Client Matrix                                     | Soil Vapor            |   | Soil Vapor            |   |
| Compound                                          | Result                | Q | Result                | Q |
| <b>Volatile Organics, EPA TO15 Full List</b>      | ug/m3                 |   | ug/m3                 |   |
| <b>Dilution Factor</b>                            | 1577.29               |   | 15.02                 |   |
| 1,1,1,2-Tetrachloroethane                         | 10                    | U | 10                    | U |
| 1,1,1-Trichloroethane                             | 300                   | D | 42                    | D |
| 1,1,2,2-Tetrachloroethane                         | 10                    | U | 10                    | U |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113) | 11                    | U | 12                    | U |
| 1,1,2-Trichloroethane                             | 8                     | U | 8.200                 | U |
| 1,1-Dichloroethane                                | 6                     | U | 6.100                 | U |
| 1,1-Dichloroethylene                              | 2.900                 | D | 1.500                 | U |
| 1,2,4-Trichlorobenzene                            | 11                    | U | 11                    | U |
| 1,2,4-Trimethylbenzene                            | 7.200                 | U | 7.400                 | U |
| 1,2-Dibromoethane                                 | 11                    | U | 12                    | U |
| 1,2-Dichlorobenzene                               | 8.900                 | U | 9                     | U |
| 1,2-Dichloroethane                                | 6                     | U | 6.100                 | U |
| 1,2-Dichloropropane                               | 6.800                 | U | 6.900                 | U |
| 1,2-Dichlorotetrafluoroethane                     | 10                    | U | 10                    | U |
| 1,3,5-Trimethylbenzene                            | 7.200                 | U | 7.400                 | U |
| 1,3-Butadiene                                     | 9.800                 | U | 10                    | U |
| 1,3-Dichlorobenzene                               | 8.900                 | U | 9                     | U |
| 1,3-Dichloropropane                               | 6.800                 | U | 6.900                 | U |
| 1,4-Dichlorobenzene                               | 8.900                 | U | 9                     | U |
| 1,4-Dioxane                                       | 11                    | U | 11                    | U |
| 2-Butanone                                        | 4.300                 | U | 8.900                 | D |
| 2-Hexanone                                        | 12                    | U | 12                    | U |
| 3-Chloropropene                                   | 23                    | U | 24                    | U |
| 4-Methyl-2-pentanone                              | 6                     | U | 6.200                 | U |
| Acetone                                           | 21                    | D | 59                    | D |
| Acrylonitrile                                     | 3.200                 | U | 3.300                 | U |
| Benzene                                           | 5.200                 | D | 4.800                 | U |
| Benzyl chloride                                   | 7.600                 | U | 7.800                 | U |
| Bromodichloromethane                              | 9.900                 | U | 10                    | U |
| Bromoform                                         | 15                    | U | 16                    | U |
| Bromomethane                                      | 5.700                 | U | 5.800                 | U |
| Carbon disulfide                                  | 4.600                 | U | 4.700                 | U |
| Carbon tetrachloride                              | 72                    | D | 46                    | D |
| Chlorobenzene                                     | 6.800                 | U | 6.900                 | U |
| Chloroethane                                      | 3.900                 | U | 4                     | U |
| Chloroform                                        | 420                   | D | 51                    | D |
| Chloromethane                                     | 3                     | U | 3.100                 | U |
| cis-1,2-Dichloroethylene                          | 140                   | D | 21                    | D |
| cis-1,3-Dichloropropylene                         | 6.700                 | U | 6.800                 | U |
| Cyclohexane                                       | 5.100                 | D | 5.200                 | U |
| Dibromochloromethane                              | 13                    | U | 13                    | U |
| Dichlorodifluoromethane                           | 7.300                 | U | 7.400                 | U |
| Ethyl acetate                                     | 11                    | U | 11                    | U |
| Ethyl Benzene                                     | 6.400                 | U | 6.500                 | U |
| Hexachlorobutadiene                               | 16                    | U | 16                    | U |
| Isopropanol                                       | 11                    | D | 17                    | D |
| Methyl Methacrylate                               | 6                     | U | 6.100                 | U |
| Methyl tert-butyl ether (MTBE)                    | 5.300                 | U | 5.400                 | U |
| Methylene chloride                                | 21                    | D | 10                    | U |
| n-Heptane                                         | 6                     | U | 6.200                 | U |
| n-Hexane                                          | 5.200                 | U | 5.300                 | U |
| o-Xylene                                          | 6.400                 | U | 6.500                 | U |
| p- & m- Xylenes                                   | 13                    | U | 13                    | U |
| p-Ethyltoluene                                    | 7.200                 | U | 7.400                 | U |
| Propylene                                         | 11                    | D | 3.600                 | D |
| Styrene                                           | 6.300                 | U | 6.400                 | U |
| Tetrachloroethylene                               | 1,600                 | D | 11                    | D |
| Tetrahydrofuran                                   | 8.700                 | U | 8.900                 | U |
| Toluene                                           | 33                    | D | 7.400                 | D |
| trans-1,2-Dichloroethylene                        | 26                    | D | 6                     | U |
| trans-1,3-Dichloropropylene                       | 6.700                 | U | 6.800                 | U |
| Trichloroethylene                                 | 180,000               | D | 1,900                 | D |
| Trichlorofluoromethane (Freon 11)                 | 8.300                 | U | 8.400                 | U |
| Vinyl acetate                                     | 5.200                 | U | 5.300                 | U |
| Vinyl bromide                                     | 6.400                 | U | 6.600                 | U |
| Vinyl Chloride                                    | 1.900                 | U | 1.900                 | U |

**NOTES:**

Any Regulatory Exceedences are color coded by Regulation

**Q is the Qualifier Column with definitions as follows:**

D=result is from an analysis that required a dilution

J=analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit) - data is estimated

U=analyte not detected at or above the level indicated



## **APPENDIX E – GREEN AND SUSTAINABLE REMEDIATION DOCUMENTATION**



GZA GeoEnvironmental, Inc.