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

June 2024 Revised July 2024
File No. 41.0163279.00

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

PREPARED BY:
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June 24, 2024: Revised July 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 or Mark Hutson at (646) 929-8955 or Mark.Hutson@gza.com.

Very truly yours,

GZA GEOENVIRONMENTAL OF NEW YORK

Mark Hutson, P.G.
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Enclosure: Remedial Investigation Work Plan



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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 180,000 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 screens will be installed based on the geology of the site, one well in each cluster will be above the clay layer and one will be below. 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 containers 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 Biphenyls (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 or above the clay layer whichever is shallower 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 Byphenols (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 in 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
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 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 TCL SVOC by EPA Method 8270 TAL metals by EPA Method 6000/7000 series Pesticides/PCBs by EPA Method 8081/8082 1,4-Dioxane and PFAS
Soil	SB-16 - S 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 TCL SVOC by EPA Method 8270 TAL metals by EPA Method 6000/7000 series Pesticides/PCBs by EPA Method 8081/8082 1,4-Dioxane and PFAS
Soil	SB-17 - S 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 TCL SVOC by EPA Method 8270 TAL metals by EPA Method 6000/7000 series Pesticides/PCBs by EPA Method 8081/8082 1,4-Dioxane and PFAS
Soil	SB-18 - S 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 TCL SVOC by EPA Method 8270 TAL metals by EPA Method 6000/7000 series Pesticides/PCBs by EPA Method 8081/8082 1,4-Dioxane and PFAS
Soil	SB-19 - S 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 TCL SVOC by EPA Method 8270 TAL metals by EPA Method 6000/7000 series Pesticides/PCBs by EPA Method 8081/8082 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 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-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 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

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

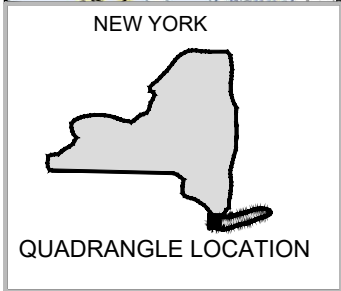
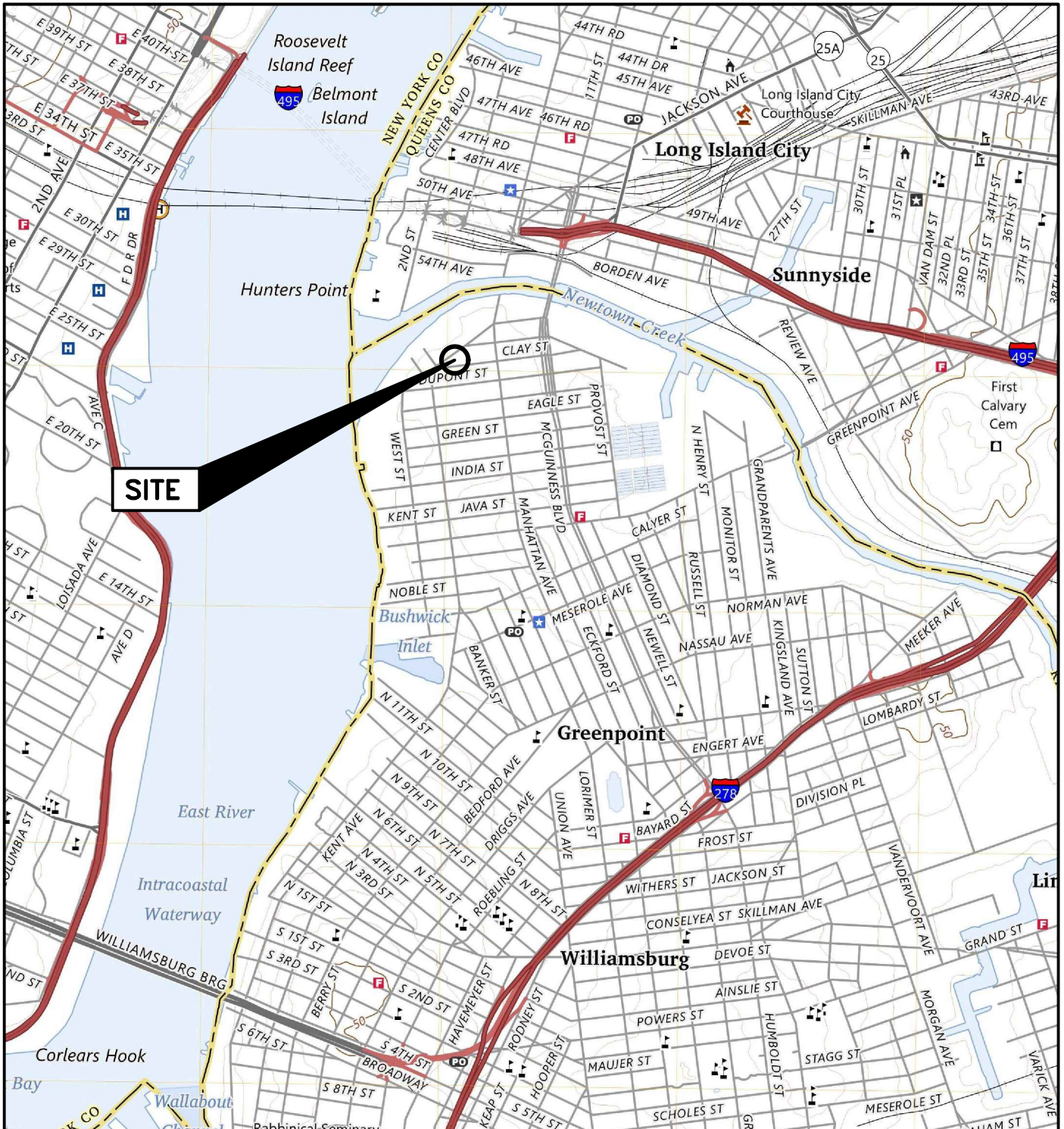
Table 1
Sample Summary
19 Clay Street and 60-62 Commercial Street, Brooklyn NY
NYSDEC BCP Site No. C224390

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



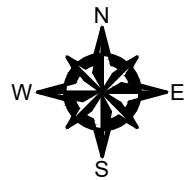
FIGURES

© 2022 - GZA GeoEnvironmental of NY.
 GZA-J:\Active 163200 to 163299\163279.00 - 19 Clay Street and 60-62 Commercial St\Drawings\41.0163279.00 Figures 1,2,3,6.dwg [FIG 1 8.5x11] June 19, 2024 - 10:17am Selia.Gupta




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

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SITE LOCATION MAP

NYSDEC BCP SITE NO. C224390
 19-27 CLAY ST AND 60-62 COMMERCIAL ST
 BROOKLYN, NY 11222

PREPARED BY:
 **GZA** GeoEnvironmental of NY
 Engineers and Scientists
 www.gza.com

PROJ MGR: MH
 DESIGNED BY: SG
 DATE: JUNE 2024

REVIEWED BY: MH
 DRAWN BY: SG
 PROJECT NO. 41.0163279.00

PREPARED FOR:
 CLAY PROPERTIES, LLC

CHECKED BY: VW
 SCALE: 1"=2000'
 REVISION NO. -

FIGURE 1
 SHEET NO. 1 OF 1

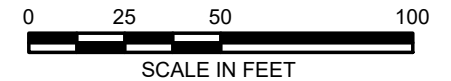
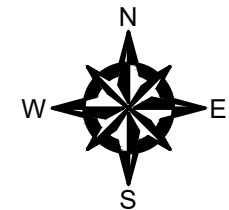


GENERAL NOTES

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

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NYSDEC BCP SITE NO. C224390
19-27 CLAY ST AND 60-62 COMMERCIAL ST
BROOKLYN, NY 11222

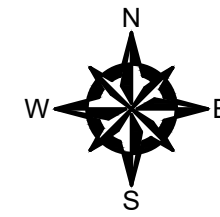
AERIAL MAP

PREPARED BY:  GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	
PROJ MGR: MH	REVIEWED BY: MH
DESIGNED BY: SG	DRAWN BY: SG
DATE: JUNE, 2024	PROJECT NO. 41.0163279.00

PREPARED FOR: CLAY PROPERTIES, LLC	
CHECKED BY: VW	FIGURE
SCALE: 1" = 50'	2
REVISION NO. -	SHEET NO. 1 OF 1

COMMERCIAL STREET

Sample ID	UURSCO	RRSCO	SB-10 (0-2')	SB-10 (4-6')
York ID			23B0727-03	23B0727-04
Sampling Date			3/2023 9:35:00	3/2023 9:40:00
Client Matrix			Soil	Soil
Compound			Result	Q
Metals, Target Analyte	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1
Lead	63	400	436	22.400
Mercury by 7473	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1
Mercury	0.18	0.81	4.280	0.0381 U
PEST, 8081 MASTER	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			5	5
4,4'-DDT	0.0033	7.9	0.00565 D	0.00207 U



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.

Sample ID	UURSCO	RRSCO	SB-9 (0-2')	SB-9 (4-6')
York ID			23B0727-01	23B0727-02
Sampling Date			3/2023 9:05:00	3/2023 9:15:00
Client Matrix			Soil	Soil
Compound			Result	Q
Metals, Target Analyte	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1
Arsenic	13	16	23.200	5.240
Lead	63	400	982	13.200
Zinc	109	10000	289	300
Mercury by 7473	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1
Mercury	0.18	0.81	0.847	0.0352 U
PEST, 8081 MASTER	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			5	5
4,4'-DDT	0.0033	7.9	0.00781 D	0.00193 U

GW-5 / SB-10

GW-4 / SB-9

SB-8

Sample ID	UURSCO	RRSCO	SB-8 (0-2')	SB-8 (4-6')
York ID			23B0727-05	23B0727-06
Sampling Date			3/2023 10:10:00	3/2023 10:38:00
Client Matrix			Soil	Soil
Compound			Result	Q
SVOA, 8270 MASTER	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			25	2
Benzo(a)anthracene	1	1	9.690 D	0.0502 U
Benzo(a)pyrene	1	1	8.110 D	0.0502 U
Benzo(b)fluoranthene	1	1	6.130 D	0.0502 U
Benzo(k)fluoranthene	0.8	3.9	7.640 D	0.0502 U
Chrysene	1	3.9	9.060 D	0.0502 U
Dibenzo(a,h)anthracene	0.33	0.33	3.270 D	0.0502 U
Indeno(1,2,3-cd)pyrene	0.5	0.5	3.480 D	0.0502 U
Phenol	0.33	100	0.459 D	0.0502 U
Metals, Target Analyte	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1
Copper	50	270	365	2.010 U
Lead	63	400	1,180	28.100 U
Nickel	30	310	74.700	2.440 U
Zinc	109	10000	476	5.730 U
Mercury by 7473	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1
Mercury	0.18	0.81	1.060	0.0362 U
PEST, 8081 MASTER	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			50	5
4,4'-DDE	0.0033	8.9	0.956 D	0.00995 D
4,4'-DDT	0.0033	7.9	0.307 DF	0.0230 D
Dieldrin	0.005	0.2	0.369 DF	NT
PCB, 8082 MASTER	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			10	1
Total PCBs	0.1	1	7.930 D	0.438

SB-14

SB-13

SB-12

SB-11

CLAY STREET

LEGEND

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



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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 163200 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 - 5:36pm Sella.Gupta

Sample ID York ID Client Matrix	NYSDEC TOGS Standards and Guidance Values	GW-4 23B0727-09 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 York ID Client Matrix	NYSDEC TOGS Standards and Guidance Values	GW-8 23E0792-03 Water	
Compound	- GA	Result	Q
VOA, 8260 LOW MASTER	ug/L	ug/L	
Dilution Factor		1	
Trichloroethylene	5	19.4	

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

Sample ID York ID Client Matrix	NYSDEC TOGS Standards and Guidance Values	GW-5 23B0727-08 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 York ID Client Matrix	NYSDEC TOGS Standards and Guidance Values	GW-7 23E0792-02 Water	
Compound	- GA	Result	Q
VOA, 8260 LOW MASTER	ug/L	ug/L	
Dilution Factor		1	
Trichloroethylene	5	142.0	

COMMERCIAL STREET

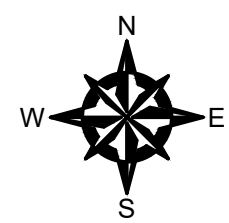
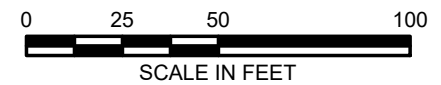
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LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE GROUNDWATER SAMPLE LOCATIONS



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GROUNDWATER SAMPLE RESULTS OVER TOGS

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PROJ MGR: MH	REVIEWED BY: VW	CHECKED BY: MH	FIGURE 4 SHEET NO. 1 OF 1
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Sample ID	SV-9	
York ID	23B0837-04	
Sampling Date	2/14/2023 12:00:00 PM	
Client Matrix	Soil Vapor	
Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	6.064	
1,1,1-Trichloroethane	3.300	U
1,1-Dichloroethylene	0.600	U
Carbon tetrachloride	1.500	D
cis-1,2-Dichloroethylene	0.600	U
Methylene chloride	4.200	U
Tetrachloroethylene	260	D
Trichloroethylene	60	D

Sample ID	SV-7	
York ID	23B0837-02	
Sampling Date	2/14/2023 1:01:00 PM	
Client Matrix	Soil Vapor	
Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	7.06	
1,1,1-Trichloroethane	3.900	U
1,1-Dichloroethylene	0.700	U
Carbon tetrachloride	1.100	U
cis-1,2-Dichloroethylene	0.700	U
Methylene chloride	4.900	U
Tetrachloroethylene	430	D
Trichloroethylene	11	D

Sample ID	SV-8	
York ID	23B0837-03	
Sampling Date	2/14/2023 12:09:00 PM	
Client Matrix	Soil Vapor	
Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	31.08	
1,1,1-Trichloroethane	8.500	U
1,1-Dichloroethylene	1.500	U
Carbon tetrachloride	27	D
cis-1,2-Dichloroethylene	2.500	D
Methylene chloride	11	U
Tetrachloroethylene	220	D
Trichloroethylene	5,500	D

Sample ID	SV-10	
York ID	23E0786-02	
Sampling Date	5/12/2023 10:40	
Client Matrix	Soil Vapor	
Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	1577.29	
1,1,1-Trichloroethane	300	D
1,1-Dichloroethylene	2.9	D
Carbon tetrachloride	72	D
cis-1,2-Dichloroethylene	140	D
Methylene chloride	21	D
Tetrachloroethylene	1,600	D
Trichloroethylene	180,000	D

Sample ID	SV-11	
York ID	23E0786-02	
Sampling Date	5/12/2023 10:40	
Client Matrix	Soil Vapor	
Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	15.02	
1,1,1-Trichloroethane	42.000	D
1,1-Dichloroethylene	1.500	U
Carbon tetrachloride	46.000	D
cis-1,2-Dichloroethylene	21.000	D
Methylene chloride	10.000	U
Tetrachloroethylene	11	D
Trichloroethylene	1,900	D




COMMERCIAL STREET

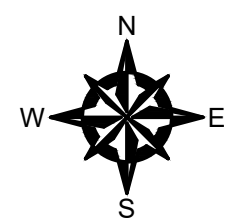
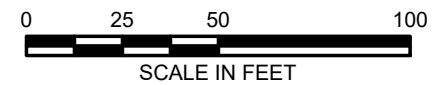
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LEGEND

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




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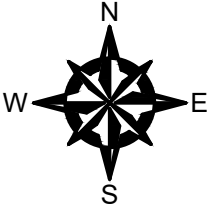
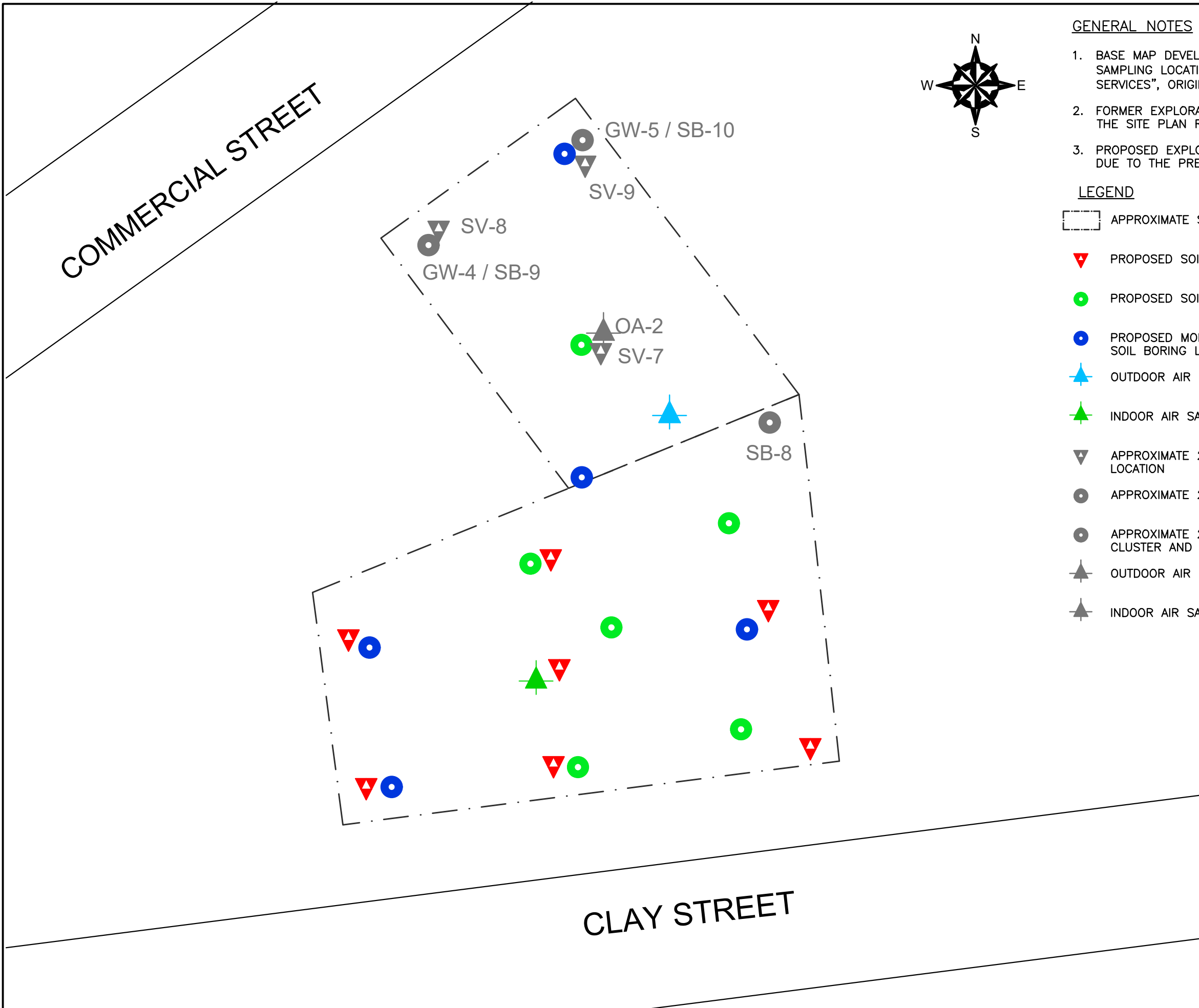
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SOIL VAPOR ANALYTICAL RESULTS

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--	---------------------------------------

PROJ MGR: MH	REVIEWED BY: VW	CHECKED BY: MH	FIGURE 5 SHEET NO. 1 OF 1
DESIGNED BY: MH	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: JUNE 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	

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 GZA-J:\Active 163200 to 163299\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 Seila.Gupta

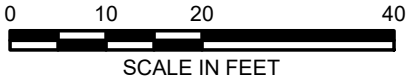


GENERAL NOTES

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



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PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 6 SHEET NO. 1 OF 1
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QAPP/FSP – 55 Eckford Street, Brooklyn, NY

ATTACHMENTS



APPENDIX A – QUALITY ASSURANCE PROJECT PLAN (QAPP)



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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 4th 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



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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 (mg/kg), micrograms per liter ($\mu\text{g}/\text{L}$) or milligrams per liter (mg/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 ≤ 50 for soil samples and ≤ 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 ± 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[®] canister. SUMMA[®] canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. After connecting the SUMMA[®] 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[®] canister. SUMMA[®] 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[®], 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: XXXXXXXXXX
 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,



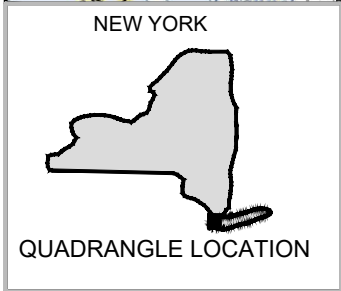
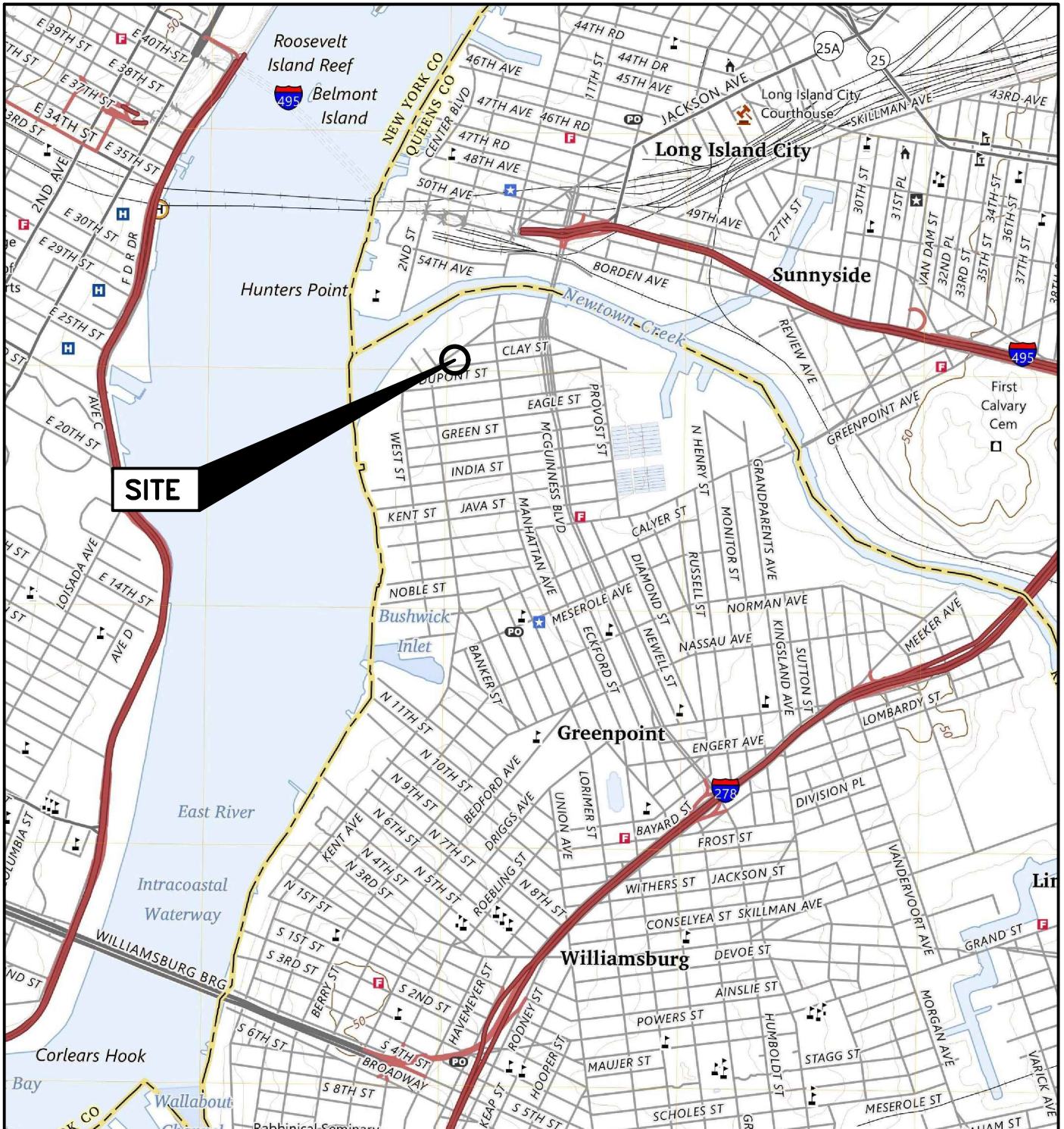
the laboratory will contact the Program Manager, who will determine the action to be taken and inform the appropriate personnel.

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



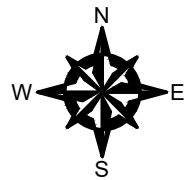
FIGURES

© 2022 - GZA GeoEnvironmental of NY.
 GZA-J:\Active 163200 to 163299\163279.00 - 19 Clay Street and 60-62 Commercial St\Drawings\41.0163279.00 Figures 1,2,3,6.dwg [FIG 1 8.5x11] June 19, 2024 - 10:17am Selia.Gupta



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

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NYSDEC BCP SITE NO. C224390
 19-27 CLAY ST AND 60-62 COMMERCIAL ST
 BROOKLYN, NY 11222

SITE LOCATION MAP

PREPARED BY:
GZA GeoEnvironmental of NY
 Engineers and Scientists
 www.gza.com

PROJ MGR: MH REVIEWED BY: MH
 DESIGNED BY: SG DRAWN BY: SG
 DATE: JUNE 2024 PROJECT NO. 41.0163279.00

PREPARED FOR:
 CLAY PROPERTIES, LLC

CHECKED BY: VW
 SCALE: 1"=2000'
 REVISION NO. -

FIGURE
1
 SHEET NO. 1 OF 1



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 ^a	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 ^m	16 ^f	17 ^f	18 ^f	19 ^f	13 ^f	16 ^f
Barium	350 ^m	350 ^f	400	400	10,000 ^d	433	820
Beryllium	7.2	14	72	590	2,700	10	47
Cadmium	2.5 ^m	2.5 ^f	4.3	9.3	60	4	7.5
Chromium, hexavalent ^h	1 ⁱ	22	110	400	800	1 ^e	19
Chromium, trivalent ^h	30 ^m	36	180	1,500	6,800	41	NS
Copper	50	270	270	270	10,000 ^d	50	1,720
Total Cyanide ^h	27	27	27	27	10,000 ^d	NS	40
Lead	63 ^m	400	400	1,000	3,900	63 ^f	450
Manganese	1600 ^m	2,000 ^f	2,000 ^f	10,000 ^d	10,000 ^d	1600 ^f	2,000 ^f
Total Mercury	0.18 ^m	0.81 ^j	0.81 ^j	2.8 ^j	5.7 ^j	0.18 ^f	0.73
Nickel	30	140	310	310	10,000 ^d	30	130
Selenium	3.9 ^m	36	180	1,500	6,800	3.9 ^f	4 ^f
Silver	2	36	180	1,500	6,800	2	8.3
Zinc	109 ^m	2200	10,000 ^d	10,000 ^d	10,000 ^d	109 ^f	2,480
PCBs/Pesticides							
2,4,5-TP Acid (Silvex)	3.8	58	100 ^a	500 ^b	1,000 ^c	NS	3.8
4,4'-DDE	0.0033 ^l	1.8	8.9	62	120	0.0033 ^e	17
4,4'-DDT	0.0033 ^l	1.7	7.9	47	94	0.0033 ^e	136
4,4'-DDD	0.0033 ^l	2.6	13	92	180	0.0033 ^e	14
Aldrin	0.005 ^m	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 ^e	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 ^a	100 ^a	500 ^b	1,000 ^c	0.04 ^e	0.25
Dibenzofuran	7	14	59	350	1,000 ^c	NS	210
Dieldrin	0.005 ^m	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	2.4	4.8 ⁱ	24 ⁱ	200 ⁱ	920 ⁱ	NS	102
Endosulfan II	2.4	4.8 ⁱ	24 ⁱ	200 ⁱ	920 ⁱ	NS	102
Endosulfan sulfate	2.4	4.8 ⁱ	24 ⁱ	200 ⁱ	920 ⁱ	NS	1,000 ^c
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 ^a	100 ^a	500 ^b	1,000 ^c	20	98
Acenaphthylene	100 ^k	100 ^a	100 ^a	501 ^b	1,000 ^c	NS	107
Anthracene	100 ^k	100 ^a	100 ^a	502 ^b	1,000 ^c	NS	1,000 ^c
Benz(a)anthracene	1 ^m	1 ^f	1 ^f	5.6	11	NS	1 ^f
Benzo(a)pyrene	1 ^m	1 ^f	1 ^f	1 ^f	1.1	2.6	22
Benzo(b)fluoranthene	1 ^m	1 ^f	1 ^f	5.6	11	NS	1.7
Benzo(g,h,i)perylene	100	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	1,000 ^c
Benzo(k)fluoranthene	0.8 ^m	1	3.9	56	110	NS	1.7
Chrysene	1 ^m	1 ^f	3.9	56	110	NS	1 ^f
Dibenz(a,h)anthracene	0.33 ⁱ	0.33 ^e	0.33 ^e	0.56	1.1	NS	1,000 ^c
Fluoranthene	100 ^k	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	1,000 ^c
Fluorene	30	100 ^a	100 ^a	500 ^b	1,000 ^c	30	386
Indeno(1,2,3-cd)pyrene	0.5 ^m	0.5 ^f	0.5 ^f	5.6	11	NS	8.2
m-Cresol	0.33 ⁱ	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.33 ^e
Naphthalene	12	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	12
o-Cresol	0.33 ⁱ	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.33 ^e
p-Cresol	0.33 ⁱ	34	100 ^a	500 ^b	1,000 ^c	NS	0.33 ^e
Pentachlorophenol	0.8 ^l	2.4	6.7	6.7	55	0.8 ^e	0.8 ^e
Phenanthrene	100	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	1,000 ^c
Phenol	0.33 ⁱ	100 ^a	100 ^a	500 ^b	1,000 ^c	30	0.33 ^e
Pyrene	100	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	1,000 ^c

**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 ^a	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 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.68
1,1-Dichloroethane	0.27	19	26	240	480	NS	0.27
1,1-Dichloroethene	0.33	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	0.33
1,2-Dichlorobenzene	1.1	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	1.1
1,2-Dichloroethane	0.02 ^m	2.3	3.1	30	60	10	0.02 ^f
cis-1,2-Dichloroethene	0.25	59	100 ^a	500 ^b	1,000 ^c	NS	0.25
trans-1,2-Dichloroethene	0.19	100 ^a	100 ^a	500 ^b	1,000 ^c	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 ^l	9.8	13	130	250	0.1 ^e	0.1 ^e
Acetone	0.05	100 ^a	100 ^b	500 ^b	1,000 ^c	2.2	0.05
Benzene	0.06	2.9	4.8	44	89	70	0.06
Butylbenzene	12	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	12
Carbon tetrachloride	0.76	1.4	2.4	22	44	NS	0.76
Chlorobenzene	1.1	100 ^a	100 ^a	500 ^b	1,000 ^c	40	1.1
Chloroform	0.37	10	49	350	700	12	0.37
Ethylbenzene	1	30	41	390	780	NS	1
Hexachlorobenzene	0.33 ^l	0.33 ^e	1.2	6	12	NS	3.2
Methyl ethyl ketone	0.12	100 ^a	100 ^a	500 ^b	1,000 ^c	100 ^a	0.12
Methyl tert-butyl ether	0.93	62	100 ^a	500 ^b	1,000 ^c	NS	0.93
Methylene chloride	0.05	51	100 ^a	500 ^b	1,000 ^c	12	0.05
n-Propylbenzene	3.9	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	3.9
sec-Butylbenzene	11	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	11
tert-Butylbenzene	5.9	100 ^a	100 ^a	500 ^b	1,000 ^c	NS	5.9
Tetrachloroethene	1.3	5.5	19	150	300	2	1.3
Toluene	0.7	100 ^a	100 ^a	500 ^b	1,000 ^c	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 ^a	100 ^a	500 ^b	1,000 ^c	0.26	1.6
Per- and Polyfluoroalkyl Substances (PFAS)^o							
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
<p>Notes:</p> <p>^a The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm.</p> <p>^b The SCOs for commercial use were capped at a maximum value of 500 ppm.</p> <p>^c The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm.</p> <p>^d The SCOs for metals were capped at a maximum value of 10,000 ppm.</p> <p>^e For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value.</p> <p>^f 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.</p> <p>^g This SCO is derived from data on mixed isomers of BHC.</p> <p>^h 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.</p> <p>ⁱ This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate.</p> <p>^j This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).</p> <p>^k The SCOs for unrestricted use were capped at a maximum value of 100 ppm.</p> <p>^l 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.</p> <p>^m 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.</p> <p>ⁿ 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.</p> <p>^o 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.</p>							

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 ¹ , ug/L
Metals	
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
PCBs/Pesticides	
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 ¹ , ug/L
PCBs/Pesticides, Con't.	
gamma-Chlordane	0.12
Heptachlor	0.04
Heptachlor epoxide	0.03
Lindane	---
Methoxychlor	35
Polychlorinated biphenyls	---
Toxaphene	0.06
Semivolatiles	
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 ¹ , ug/L
Semivolatiles, Con't.	
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
Volatiles	
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 ¹ , ug/L
Volatiles, Con't.	
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 ²
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 ¹ , ug/L
Volatiles, Con't.	
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
Per- and Polyfluoroalkyl Substances (PFAS)	
PFOA	0.01 ²
PFOS	0.01 ²
Notes: ¹ - Division of Water Technical and Operational Guidance Values (TOGS) Ambient Water Quality Standards and Guidance Values (AWQS), ug/L ² - Guidance value for 1,4-Dioxane, PFOA, and PFOS is from the NYSDEC Guidance to Regulate PFOA, PFOS, and 1,4-Dioxane in State Waters, dated October 5, 2021 ug/L - micro gram per liter	

Table 1C
Soil Vapor Criteria Table
19 Clay Street 60-62 Commercial 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
19 Clay Street 60-62 Commercial 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		
Dibromochloromethane	124481	-	-	-	-	NA	TD
Dichlorodifluoromethane	75718	10	16.5	-	-	NA	TD
Ethanol	64175	1300	210	-	-	L	TD
Ethyl Acetate	141786	-	5.4	-	-	M	TD
Ethylbenzene	100414	6.4	5.7	7.62	-	M	D
Freon-113	76131	2.5	3.5	-	-	L	TD
Freon-114	76142	0.4	<6.8	-	-	NA	TD
Heptane	142825	18	-	-	-	M	E
Hexachlorobutadiene	87683	0.5	<6.8	-	-	M	TD
Isopropanol	67630	-	-	-	-	M	TD
Methyl tert butyl ether	1634044	14	11.5	36	-	M	TD
Methylene chloride	75092	16	10	7.5	60	NA	TD
n-Hexane	110543	14	10.2	-	-	M	E
o-Xylene	95476	7.1	7.9	7.24	-	M	D
p/m-Xylene	179601231	11	22.2	22.2	-	M	E
Styrene	100-42-5	1.4	1.9	5.13	-	M	TD
Tertiary butyl Alcohol	75-65-0	-	-	-	-	NA	TD
Tetrachloroethene (PCE)	127184	2.5	15.9	6.01	30	H	B
Tetrahydrofuran	109999	0.8	-	-	-	M	TD
Toluene	108883	57	43	39.8	-	L	F
trans-1,2-Dichloroethene	156605	-	-	-	-	NA	TD
trans-1,3-Dichloropropene	10061026	NC	<1.3	-	-	NA	TD
Trichloroethene	79016	0.5	4.2	1.36	2	H	A
Trichlorofluoromethane	75694	12	18.1	-	-	L	TD
Vinyl bromide	593602	-	-	-	-	H	TD
Vinyl chloride	75014	0.4	<1.9	-	-	H	A
Notes							
Decision Criteria used:							
Martix A: Sub-Slab >5, Indoor Air >5		ND - Non-detect					
Martix B: Sub-Slab >100, Indoor Air >30		NA - Not applicable					
Toxicities from DAR-1 Appendix C/SCG/ACG		NFA - No further action					
(H) HIGH Toxicity Contaminant.		TD - To be determined based on the NYSDOH VI Decision					
(M) MODERATE Toxicity Contaminant.							
(L) LOW Toxicity Contaminant.		Reasonable - Take reasonable/practical actions to identify source/reduce exposure					
<u>NYSDOH Soil Vapor Intrusion Guidance Criteria</u>							
1 - Table C-1 2003 Upper Fence Study of Volatile Organic Chemicals in air of Fuel Oil Heated Homes for Indoor Air							
2 - Table C-2 2001 USEPA BASE 90th Percentile for Indoor Air							
3 -Table C-5 2005 Health Effects Institute 95th Percentile for Indoor Air							
4 -NYSDOH Air Guidance Value							
NYSDOH Specific Compounds for Matrix Eval							

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 ¹	EPA Analytical Method	Sample Preservation	Holding Time ²	Sample Container ³
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 (TCL)	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 (TCL)	10	SW-846 Method 8260C	HCl; Cool to 4° C; no headspace	14 days to analysis	(3) Vial
	VOCs with TICs, including 1,4-Dioxane (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 (TCL)	10	SW-846 Method 8270D	Cool to 4° C	7 days to extraction	(2) 250 mL amber glass jar
	SVOCs with TICs (TCL)					
Groundwater	Metals- total (TAL)	10	SW-846 Method 6020B/7470A Series	HNO ₃ ; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other	(1) 500 mL plastic container
	Metals-dissolved (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 ₃ ; 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:

¹ Actual number of samples may vary depending on field conditions, sample material availability, and field observations. See RIWP for estimates.

² Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.

³ 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	<table border="0"> <tr> <td><u>Surrogates</u></td> <td><u>% Rec.</u></td> </tr> <tr> <td>1,2-Dichloroethane-d4</td> <td>70-130</td> </tr> <tr> <td>4-Bromofluorobenzene</td> <td>70-130</td> </tr> <tr> <td>Dibromofluoromethane</td> <td>70-130</td> </tr> <tr> <td>Toluene-d8</td> <td>70-130</td> </tr> <tr> <td>2-Chloroethoxyethane</td> <td>70-130</td> </tr> <tr> <td><u>Matrix Spikes</u></td> <td>30-151% recovery</td> </tr> </table>	<u>Surrogates</u>	<u>% Rec.</u>	1,2-Dichloroethane-d4	70-130	4-Bromofluorobenzene	70-130	Dibromofluoromethane	70-130	Toluene-d8	70-130	2-Chloroethoxyethane	70-130	<u>Matrix Spikes</u>	30-151% recovery	<table border="0"> <tr> <td><u>Surrogates:</u></td> </tr> <tr> <td>All samples, standards, QC samples</td> </tr> <tr> <td><u>Matrix Spikes:</u></td> </tr> <tr> <td>One per 30 per matrix type</td> </tr> </table>	<u>Surrogates:</u>	All samples, standards, QC samples	<u>Matrix Spikes:</u>	One per 30 per matrix type	<table border="0"> <tr> <td><u>Field Duplicates</u></td> <td></td> </tr> <tr> <td>RPD <30</td> <td></td> </tr> <tr> <td><u>MS/MSDs</u></td> <td>(RPD)</td> </tr> <tr> <td>RPD <30</td> <td></td> </tr> </table>	<u>Field Duplicates</u>		RPD <30		<u>MS/MSDs</u>	(RPD)	RPD <30		<table border="0"> <tr> <td><u>Field Duplicates:</u></td> </tr> <tr> <td>One per 20 per soils</td> </tr> <tr> <td><u>MS/MSDs:</u></td> </tr> <tr> <td>One per 30 per matrix type</td> </tr> </table>	<u>Field Duplicates:</u>	One per 20 per soils	<u>MS/MSDs:</u>	One per 30 per matrix type		
<u>Surrogates</u>	<u>% Rec.</u>																																					
1,2-Dichloroethane-d4	70-130																																					
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Table 3
 Typical Laboratory Data Quality Objectives
 Soil Samples
 19 Clay St. 60-62 Commercial St., Brooklyn, NY
 NYCEC BCP Site No. C224490

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

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 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. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 <u>Matrix Spikes</u> 36-162 % recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <20 <u>MS/MSDs</u> <u>RPD</u> RPD <20	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
VOCs with Tentatively Identified Compounds (TICs)	SW-846 Method 8260C	Groundwater	<u>Surrogates</u> % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 <u>Matrix Spikes</u> 36-162 % recovery	<u>Surrogates:</u> All samples, standards, QC <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <20 <u>MS/MSDs</u> <u>RPD</u> RPD <20	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
SVOCs TCL	SW-846 Method 8270D	Groundwater	<u>Surrogates</u> % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 <u>Matrix Spikes</u> 14-144%	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <50 <u>MS/MSDs</u> <u>RPD</u> RPD <50	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
SVOCs with TICs	SW-846 Method 8270D	Groundwater	<u>Surrogates</u> % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 <u>Matrix Spikes</u> 14-144%	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates:</u> RPD <50 <u>MS/MSDs</u> <u>RPD</u> RPD <50	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
1,4-Dioxane	SW-846 Method 8270D	Groundwater	<u>Surrogates</u> % Rec. 1,4-Dioxane-d8 15-110 <u>Matrix Spikes</u> 40-140% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <30 <u>Matrix Duplicates</u> RPD<30	<u>Field Duplicates:</u> One per 20 per soils <u>MS/MSDs:</u> One per 20
Metals (Total and Dissolved)	SW-846 Methods 6020B	Groundwater	<u>Matrix Spikes</u> 75-125% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <20 <u>Matrix Duplicates</u> RPD <20	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
Mercury (Total and Dissolved)	SW-846 Methods 7470A	Groundwater	<u>Matrix Spikes</u> 75-125% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <35 (dissolved) RPD<20 (Total) <u>Matrix Duplicates</u> RPD <35 (dissolved) RPD<20 (Total)	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
PCBs	SW-846 Method 8082A	Groundwater	<u>Surrogates</u> % Rec. 2,4,5,6-Tetrachloro-m-xylene 30-150 Decachlorobiphenyl 30-150 <u>Matrix Spikes</u> 40-140% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20 per matrix type	<u>Field Duplicates</u> RPD <50 <u>MS/MSDs</u> <u>(RPD)</u> RPD<50	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20 per matrix type
Herbicides	SW-846 Method 8151A	Groundwater	<u>Surrogates</u> % Rec. 2,4-DCAA 30-150 <u>Matrix Spikes</u> 30-150% Recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20 per matrix type	<u>Field Duplicates:</u> RPD <50 <u>MS/MSDs</u> <u>(RPD)</u> RPD<50	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> 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> Decachlorobiphenyl 15-142 2,4,5,6-Tetrachloro-m-xylene 36-126 <u>Matrix Spikes</u> 30-150% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20	<u>Field Duplicates</u> RPD <30 <u>MS/MSDs</u> RPD RPD <30	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20
PFAs	EPA Method 1633	Groundwater	<u>Surrogates</u> Perfluoro[13C4]Butanoic Acid (MPFBA) Perfluoro[13C4]Butanoic Acid (MPFBA) Perfluoro[13C5]Pentanoic Acid (M5PFPEA) Perfluoro[13C5]Pentanoic Acid (M5PFPEA) Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) Perfluoro[13C8]Octanoic Acid (M8PFOA) Perfluoro[13C8]Octanoic Acid (M8PFOA) 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) Perfluoro[13C9]Nonanoic Acid (M9PFNA) Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 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 N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) Perfluoro[13C8]Octanesulfonamide (M8FOSA) Perfluoro[13C8]Octanesulfonamide (M8FOSA) N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) <u>Matrix Spikes</u> 46-182% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 20 per matrix type	<u>Field Duplicates</u> RPD <30 <u>MS/MSDs</u> (RPD) RPD <30	<u>Field Duplicates:</u> One per 20 <u>MS/MSDs:</u> One per 20 per matrix
Cyanide	EPA Method 9012B	Groundwater	<u>Matrix Spikes</u> 75-125% recovery	<u>Surrogates:</u> All samples, standards, QC samples <u>Matrix Spikes:</u> One per 35	<u>Field Duplicates</u> RPD <35 <u>Matrix Duplicates</u> RPD <35	<u>Field Duplicates:</u> One per 20 <u>Matrix Duplicates:</u> 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> <u>% Rec.</u> 4-Bromofluorobenzene 78-124	<u>Surrogates:</u> All samples, standards, QC samples	<u>Matrix Duplicates</u> RPD £30	<u>Matrix Duplicates</u> 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 ¹	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 ⁶	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 ⁰ C; no headspace	14 days to analysis	(3) Vial
Groundwater	1,4-Dioxane	1	SW-846 Method 8270D	Cool to 4 ⁰ C	7 days to analysis	(2) 250 mL amber glass jar
Groundwater	SVOCs (TCL)	1	SW-846 Method 8270D	Cool to 4 ⁰ C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	Metals- total (TAL)	1	SW-846 Method 6020B/7470A Series	HNO ₃ ; Cool to 4 ⁰ 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 ₃ ; Cool to 4 ⁰ 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 ⁰ C	7 days to extraction	(2) 120 mL amber glass jar
Groundwater	Herbicides (TCL)	1	SW-846 Method 8151A	Cool to 4 ⁰ C	7 days to extraction	(2) 1000 mL amber glass jar
Groundwater	PCBs	1	SW-846 Method 8082A	Cool to 4 ⁰ C	365 days to analysis	(1) 250 mL amber glass jar
Groundwater	Cyanide	1	SW-846 Method 9012A	Cool to 4 ⁰ C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Mercury	1	SW-846 Method 7470 A	HNO ₃ ; Cool to 4 ⁰ C	28 days to analysis	(1) 250 mL plastic container
Groundwater	PFA's	1	EPA Method 1633	Cool to 4 ⁰ 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: 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 <input checked="" type="checkbox"/>	Mine Safety and Health Administration <input type="checkbox"/>
	OSHA Construction Regulations <input checked="" type="checkbox"/>	

2. EMERGENCY INFORMATION		
Hospital Name: NYU Langone	Hospital Phone: 646-929-7800	
Hospital Address: 706 Broadway, Brooklyn, NY	Directions and Street Map Attached: <input checked="" type="checkbox"/> 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>LIFTING Get help lifting or carrying anything over 50 pounds</p>	 <p>SITE RECON Walk your site before starting work to find and mark slips/trips/falls and insect nests</p>	 <p>DRIVING Don't use your mobile phone while driving</p>	 <p>ERGONOMICS Take a 5-minute break for every hour you work, whether it's in the office or the field</p>
 <p>CUTS Wear cut-resistant gloves when using knives or other sharp objects</p>	 <p>PPE At a minimum, always wear safety glasses and protective footwear in the field</p>	 <p>HASP Develop a HASP and have it with you in the field</p>	 <p>WORKCARE 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? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO 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 IF YES, EXPLAIN:
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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
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: Clay Properties, LLC	Public Access Property <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 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.	
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:	
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) <input checked="" type="checkbox"/> Abandoned or vacant building/Enclosed Spaces <input checked="" type="checkbox"/> Significant Slip/Trip/Fall Hazards <input type="checkbox"/> Unsanitary/Infectious Hazards <input type="checkbox"/> Poisonous Plants <input checked="" type="checkbox"/> Biting/Stinging Insects <input type="checkbox"/> Feral Animal Hazards <input type="checkbox"/> Water/Wetlands Hazards <input type="checkbox"/> Remote Locations/Navigation/Orientation hazards <input type="checkbox"/> Heavy Traffic or Work Alongside a Roadway <input checked="" type="checkbox"/> Weather-Related Hazards <input checked="" type="checkbox"/> Motor vehicle operation Hazards <input checked="" type="checkbox"/> Heavy Equipment Hazards <input checked="" type="checkbox"/> Structural Hazards (i.e. unsafe floors/stairways/roof) <input type="checkbox"/> Demolition/Renovation <input type="checkbox"/> Presence of Pedestrians or the General Public	<input checked="" type="checkbox"/> Overhead Hazards (i.e. falling objects, overhead power lines) <input checked="" type="checkbox"/> Portable Hand Tools or Power Tools <input checked="" type="checkbox"/> Significant Lifting or Ergonomic Hazards <input checked="" type="checkbox"/> Electrical Hazards (i.e. Equipment 120 Volts or Greater, Work Inside Electrical Panels, or Maintenance of Electrical Equipment) <input type="checkbox"/> Other Stored energy Hazards (i.e. Equipment with High Pressure or Stored Chemicals) <input type="checkbox"/> Fire and/or Explosion Hazard <input checked="" type="checkbox"/> Elevated Noise Levels <input type="checkbox"/> Excavations/Test Pits <input type="checkbox"/> Explosives or Unexploded Ordnance/MEC <input type="checkbox"/> Long Distance or Overnight Travel <input type="checkbox"/> Personal Security or High Crime Area Hazards <input type="checkbox"/> Working Alone <input type="checkbox"/> Ionizing Radiation or Non-Ionizing Radiation <input checked="" type="checkbox"/> Chemical/Exposure Hazards (See Part B for Details) <input checked="" type="checkbox"/> Other: COVID-19, Underground Utilities, Soil Handling
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B. CHEMICAL/EXPOSURE HAZARDS (CONTAMINANTS ARE CONTAINED IN X SOIL, WATER, X GROUNDWATER)

<input type="checkbox"/> No chemical hazards anticipated <input type="checkbox"/> Hydrogen Sulfide (H ₂ S) <input type="checkbox"/> Cyanides, Hydrogen Cyanide (HCN) <input type="checkbox"/> Carbon Monoxide <input type="checkbox"/> Herbicides, Pesticide, Fungicide, Animal Poisons <input checked="" type="checkbox"/> Metals, Metal Compounds: <input type="checkbox"/> Corrosives, Acids, Caustics, Strong Irritants <input type="checkbox"/> Polychlorinated Biphenyls (PCBs) <input checked="" type="checkbox"/> Polycyclic Aromatic Hydrocarbons (PAHs) <input type="checkbox"/> Compressed Gases <input type="checkbox"/> Flammable/Combustible Liquids <input type="checkbox"/> Radiation Hazards (i.e. radioactive sealed/open source, x-rays, ultra violet, infrared, radio-frequency, etc.)	<input type="checkbox"/> Methane <input type="checkbox"/> Chemicals Subject to OSHA Hazard Communication (attach Safety Data Sheet for each chemical GZA brings to the site) <input type="checkbox"/> Containerized Waste, Chemicals in Piping & Process Equipment <input type="checkbox"/> Emissions from Gasoline-, Diesel-, Propane-fired Engine, Heater, Similar Equipment <input type="checkbox"/> General Work Site Airborne Dust Hazards <input checked="" type="checkbox"/> Volatile Organic Compounds (VOCs), BTEX <input checked="" type="checkbox"/> Chlorinated Organic Compounds <input checked="" type="checkbox"/> Fuel Oil, Gasoline, Petroleum Products, Waste Oil <input type="checkbox"/> Asbestos <input type="checkbox"/> Oxygen Deficiency, Asphyxiation Hazards <input checked="" type="checkbox"/> Other: Silica
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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	Task 21.1 – General Outdoor Field Work Task 4.1 – Drilling Observations Task 4.5 – Soil-Gas Sampling Task 20.11 – Field Sampling COVID-19
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	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 646-929-8908) 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: Notify PM for rescheduling site visits. See attached JHA and Follow Client specific work procedures related to Covid19 prevention if applicable
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	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. See attached Policy - GZA policy 03-3019 Lyme Disease.
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	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.
Motor Vehicle Operation Hazard	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.
Underground Utilities	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.
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" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Duration per day (hours)</th> <th style="text-align: left;">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. raining 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"/>		
ACTION LEVELS FOR OXYGEN DEFICIENCY AND EXPLOSIVE ATMOSPHERIC HAZARDS (Action levels apply to occupied work space in general work area)		
<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 Verify presence of adequate oxygen (approx. 12% or more) before taking readings with LEL meter. 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 Greater than or Equal to 10% LEL – Discontinue work operations and immediately withdraw from area. Resume work activities ONLY after LEL readings have been reduced to less than 10% through passive dissipation, or through active vapor control measures.	
ACTION LEVELS FOR INHALATION OF TOXIC/HAZARDOUS SUBSTANCES (Action levels are for sustained breathing zone concentrations)		
<input checked="" type="checkbox"/> Applicable, See Below. <input type="checkbox"/> Not Applicable		
Air Quality Parameters (Check all that apply)	Remain in Level D 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 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 ³	If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/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 ug/m ³ of the upwind level and in preventing visible dust migration
<input type="checkbox"/>	0 to	
SPECIAL INSTRUCTIONS/COMMENTS REGARDING AIR MONITORING (IF APPLICABLE)		

8. HEALTH AND SAFETY EQUIPMENT AND CONTROLS	
<p>AIR MONITORING INSTRUMENTS</p> <input checked="" type="checkbox"/> PID Type: Lamp Energy: 10.6 eV <input type="checkbox"/> FID Type: <input type="checkbox"/> Carbon Monoxide Meter <input type="checkbox"/> Hydrogen Sulfide Meter <input type="checkbox"/> O ₂ /LEL Meter <input checked="" type="checkbox"/> Particulate (Dust) Meter <input checked="" type="checkbox"/> Calibration Gas Type - Isobutylene <input type="checkbox"/> Others: <p>OTHER H&S EQUIPMENT & GEAR</p>	<p>PERSONAL PROTECTIVE EQUIPMENT</p> <input type="checkbox"/> Respirator – Type <input type="checkbox"/> Respirator - Cartridge Type: <input checked="" type="checkbox"/> Hardhat <input checked="" type="checkbox"/> Outer Gloves Type: Nitrile <input checked="" type="checkbox"/> Inner Gloves Type: nitrile <input checked="" type="checkbox"/> Steel-toed boots/shoes <input type="checkbox"/> Coveralls – Type <input type="checkbox"/> Outer Boots – Type <input checked="" type="checkbox"/> Eye Protection with side shields <input type="checkbox"/> Face Shield

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

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

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

11. PROJECT PERSONNEL - ROLES AND RESPONSIBILITIES		
GZA ON-SITE PERSONNEL:		
Name(s)	Project Title/Assigned Role	Telephone Numbers
Mark Hutson	Site Supervisor	Work: 212-594-8140 Cell: 332-208-2260
TBD	Field Safety Officer	Work: 212-594-8140 Cell:
TBD	First Aid Personnel	Work: 212-594-8140 Cell:
TBD	GZA Project Team Members	Work: 212-594-8140 Cell:
<p>Site Supervisors and Project Managers (SS/PM): 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>Field Safety Officer (FSO): The FSO is responsible for implementation of the Site Specific Health and Safety Plan.</p> <p>First Aid Personnel: 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>GZA Project Team: Follow instructions relayed by the HASP and GZA manager on-site.</p>		
OTHER PROJECT PERSONNEL:		
Name	Project Title/Assigned Role	Telephone Numbers
Victoria D. Whelan	Principal-in-Charge	Work: (212) 594-8140 Cell: (631) 793-8821
Mark Hutson	Project Manager	Work: (212) 594-8140 Cell: (332) 208-2260
Reinbill Maniquez	Office Safety Coordinator	Work: (212) 594-8140 Cell: (347) 443-1059
Richard Ecord	GZA EHS Director	Work: 781-278-3809 Cell: 404-234-2834
<p>Principal-in-Charge: Responsible of overall project oversight, including responsibility for Health and Safety.</p> <p>Project Manager: Responsible for day-to-day project management, including Health and Safety.</p> <p>Health and Safety Coordinator: General Health and Safety guidance and assistance.</p> <p>GZA EHS Director: H &S technical and regulatory guidance, assistance regarding GZA H&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>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.</i>		
GZA Employee Name	GZA Employee Signature	Date
Subcontractor Site Worker Plan Acknowledgement		
<i>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.</i>		
Subcontractor Employee Name	Subcontractor Employee Signatures	Date
GZA HASP Approval Signatures		
<i>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.</i>		
GZA Author/Reviewer Role	Signature	Date
Mark Hutson HASP Preparer		
TBD EHS Reviewer		
Victoria D. Whelan Principal in Charge		



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

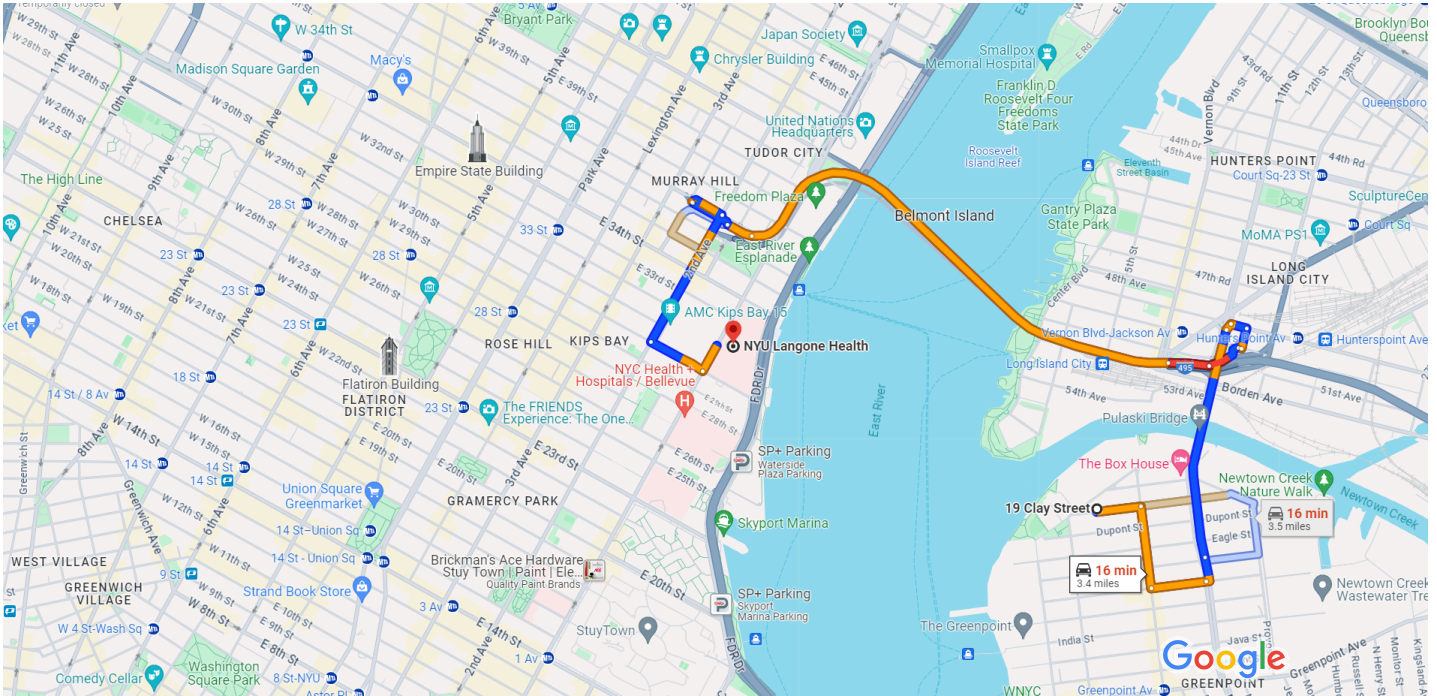


**ATTACHMENT - B
ROUTE TO HOSPITAL**



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 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
<p><u>Review Related THA's –</u> 21.1 – General Outdoor Field Work</p>		
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.
Stand clear of moving Drill Rig.		
Observation of Mobilizing Drill Rig To Job Site and positioning at borehole by Drilling Contractor	Struck by 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 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
Observation of drilling operations and monitoring well installations	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.
	Moving machinery, rotating parts, cables, ropes, etc.	<p>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</p> <p>Do not wear loose fitting clothing.</p> <p><i>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.</i> 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 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
		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.
		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.
	Exposure to Hazardous Substances/Chemicals	Become familiar with hazards associated with hazardous commercial products used in drilling (fuels, silica sand, grout, cement, bentonite, etc.). Review Safety Data Sheets (SDS) 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 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
		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	<p>Refer to the site specific HASP for chemical hazards and the necessary precautions required for sampling.</p> <p>Understand potential hazards associated with handling sample collection preservatives.</p> <p>Review and have SDS available for chemicals being brought on site, including that of sample preservatives.</p> <p>Wear appropriate PPE identified in the HASP</p> <p>Wash hands before eating and drinking. Eating and drinking are prohibited in areas of soil contamination/work area.</p>



GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

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

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"> 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.
		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.

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. Assure decontamination procedures are in place per the HASP.
	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.
	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.		
Handling Flammable Liquids	Fire Hazards	Use only approved fuel containers for fuel, heavy duty metal cans with stable base and self closing nozzle is recommended.
		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.
Mobilizing Equipment	Collision; struck by	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.
		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.
Positioning vehicle at monitoring well	Unstable, uneven terrain and ground obstacles	Locate the vehicle on stable ground. Avoid wet areas/mud when possible.
	Backing Collisions	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. Wear proper gloves (nitrile, etc.) when handling jars, preservatives could leak during shipment from the laboratory.
	Cuts and bruises from Sample jar	Do not over-tighten glass jars (especially VOAs); they can break, causing a cut.
Sampling Equipment Operation	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. Completely shut down all equipment prior to conducting maintenance activities, fueling, servicing or repairs.
	Manual lifting, equipment handling	Use proper lifting techniques when lifting equipment (generators, pumps, air compressors, tubing, etc.). Seek assistance with heavy loads.
		Use work gloves where appropriate to prevent hand injuries. Wear steel toed boots.
	Noise	Wear appropriate hearing protection during activities that produce noise (running generators, pumps, air compressors, etc.).
	Slips, trips and falls	Maintain a clean and sanitary work area free of tripping/slipping hazards.
		Store hand tools in their proper storage location when not in use.
		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.
	Tool-related hazards	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

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

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	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"> 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.
			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.			
Avoid areas with tall grasses, rocks/stone walls, wood piles/down trees.			
Water Hazards		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.
	Adverse weather	Avoid loose fitting clothing that may get caught on sampling equipment.
		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.
	Chemical Hazards	Stop work during lightening storms.
		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.
	Traffic Hazards	Be alert for site contaminants (odors, visual observations).
	Slips, trips and falls – uneven Terrain	Use safety vests and safety cones when sampling at bridges or other access points near roads/parking areas.
		Ensure stable footing before collecting sample.
Working Alone	Avoid areas along stream beds/shoreline that are "soft" or where slump may occur.	
	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.	
Emergency Conditions	Call office when off site.	
	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

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

TASK 4.4A EXCAVATION AND TRENCHING (HEAVY EQUIPMENT)

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.		
Unloading equipment and materials	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.
	Strains and sprains	Use proper lifting techniques when lifting equipment. Seek assistance with heavy loads. GZA personnel are not to 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.
Unloading equipment and materials	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.
		Confirm with contractor that excavating equipment are properly staged and stabilized to avoid roll overs and accidents.
	Underground utilities; above ground piping and appurtenances	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.	
Hazardous Liquid Spills	Keep non-essential personnel away from the work zone.	
	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."
	Hazardous Material Contamination	Loads must be of proper weight for designated road routes.
		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.
		Ensure proper waste manifestation for loads.
Handling Flammable Liquids	Fire Hazards	Use only approved fuel containers for fuel, heavy duty metal cans with stable base and self closing nozzle is recommended.
		Store flammable liquids in appropriate flammable storage cabinet.
Tool Operation	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.
General site work	Slips, trips and falls	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; 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"> • 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.
		<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>
	Adverse Weather Conditions	<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>
	Emergency Conditions	<p>Ensure that all site workers are familiar with emergency contact procedures route to nearest hospital.</p>
		<p>Ensure a first aid kit is present in field vehicle.</p>
<p>It is required that at least one individual in the field has had first aid training.</p>		
<p>Discuss any worker physical conditions that may require medical attention.</p> <p>Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.</p>		



GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

Job: Manual Excavation and Trenching		
Analysis By: Andrew Whitsitt	Reviewed By: Michael McCoy, CIH, CHMM	Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH
Date: September 30, 2011	Date: November 10, 2011	Date: November 10, 2011

TASK 4.4B MANUAL EXCAVATION AND TRENCHING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Vehicle Safety 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 you must back, do a quality 360° walkover.		
Use a spotter to help guide the backing safely.		
Look over the right shoulder and glance back to make sure fenders are clearing objects.		
Unstable, uneven terrain	Locate trailer on stable ground.	
	Level trailer with jacks, if necessary.	
	Ensure jacks are on stable footing.	
Overhead electrical lines	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"> 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.

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 Manual lifting, equipment handling	Sprains and strains	Use proper lifting techniques when lifting equipment. Seek assistance with heavy loads. GZA personnel are not to 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 transportation 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.
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.
	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.
	Exposure to Hazardous Substances	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.		
Emergency Conditions	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.	
	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: Soil-Gas Sampling		
Analysis By: Joseph DiAntonio	Reviewed By: Michael McCoy, CIH, CHMM	Approved By: Kim Anderson, Ph.D. Jayanti Chatterjee, CIH
Date: September 30, 2011	Date: November 10, 2011	Date: December 10, 2011

TASK 4.5 SOIL-GAS SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
Collection of Soil-Gas for Sampling	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). 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. Ensure that workers are familiar with potential compounds of concern during the remedial investigation. 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.
		Discuss any worker physical conditions that may require medical attention.
	Underground Utilities	Verify that proper utility locations/clearance has been performed and check area for evidence of underground features prior to breaking ground.
Sampling Near or In Roadways:	Personal injury due to vehicle traffic	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. <u>Directly inspect parking location on foot if necessary.</u>
		Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking personal or GZA vehicle.
		Use police detail (if necessary) to direct traffic while entering traffic safety zone.
Sampling in outdoor environment	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"> • 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"> • Check clothing for ticks frequently • Check whole body immediately upon returning from field and shower. <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>
Manual Installation of Sample Points	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>
Generator Use	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

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

TASK 4.6		
AST/UST INSPECTION AND SAMPLING		
HAZARD CONTROLS		
GZA Job Tasks	Potential Hazards	Controls
Observation of Excavation Operations Inspection of AST/UST (only after removal)	Various Physical hazards	Review THA for Excavation 4.4a Excavation and Trenching (Heavy Equipment).
	Traffic Hazards	Be alert for moving vehicles, equipment, pedestrians.
		Wear high visibility safety vest.
	Struck by/crushed by	Maintain eye contact with equipment operator when moving around excavation area.
		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"> 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.
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.		
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).		
Adverse weather	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 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).		
Be alert for site contaminants (odors, visual observations).		
General site work	Emergency Conditions	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

GZA Job Tasks	Potential Hazards	Controls
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.	<p>Become familiar with equipment installation procedures and related hazards through review of Job Hazard Analysis and participate in daily safety tailgate meetings.</p> <p>Review potential pinch, trip, abrasion/cut, and entanglement hazards. Wear gloves to limit potential pinch, cut, and abrasion hazards.</p> <p>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.).</p> <p>Keep cables, electrical lines, tubing organized and within view when installing or retrieving from well.</p> <p>Review weight of equipment being installed or retrieved and select methods sufficient to insure control of deployment/retrieval rate with equipment suspended in well.</p> <p>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.</p> <p>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.</p>
	Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact	<p>Use caution when opening monitoring wells for the presence of insects and vermin. Wear gloves to protect against unanticipated stinging insects or biting vermin.</p> <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"> • 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. <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>

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

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

TASK 4.8 SUBSURFACE VAPOR SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
<p><u>Review Related THA's</u> –</p> <p>4.1 Drilling Observations, Monitoring Well Installation Observations and Soil Sampling</p> <p>4.5 Soil-Gas Sampling</p> <p>4.7 Temporary/Permanent Sampling Equipment Operation</p> <p>NOTE - 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.
Screening Work Zone Atmosphere	Exposure to Hazardous Substances	Carry a cell phone during all field work for emergency purposes, and confirm that a cell phone signal is available at the site.
		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 ₂ 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.
All Site related work Work	Insect Bites; Plant toxins; Poisonous Snakes. Incidental contact	Assure adequate facilities/equipment for hand washing prior to eating.
		<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"> • 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. <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>

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	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.
	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.
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	Do not use electrical tools with damaged cords or other electrical components. Observe proper electrical safety practices. Assure 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 "off hand" from gouges, hammer blows, cutting tools, etc. Position your "off hand" to prevent injury in case of slip of the tool.
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	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. If using 120-volt AC pump to purge sampling train, verify that the ground fault circuit interrupter (GFCI) is functioning properly.
	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

GZA Job Tasks	Potential Hazards	Controls
	bruises, from Tool-Related use	



GZA GEOENVIRONMENTAL, INC. JOB HAZARD ANALYSIS WORKSHEET

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

TASK 4.9 LANDFILL SAMPLING

HAZARD CONTROLS

GZA Job Tasks	Potential Hazards	Controls
<p><u>Review Related THA's –</u> 4.1 Drilling Observations, Monitoring Well Installation Observations and Soil Sampling 4.2 Groundwater Sampling 4.3 Surface Water and Sediment Sampling</p>		
Surface Water /Groundwater Sample Collection	Slips, Trips, Falls, Drowning	<p>Become familiar with surface water and landfill topography related hazards through review of Task Hazard Analysis and site reconnaissance.</p> <p>Communicate Task Hazard Analysis and Lessons Learned information to sampling crews prior to initiating work and throughout the project as needed.</p> <p>Maintain safe distance from dams, weirs, ice bridges, and steep slopes during sampling operations.</p> <p>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.</p> <p>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.).</p> <p>Implement work practices and procedures specified in the HASP.</p>
	Exposure to Hazardous Substances	<p>LEL and H₂S 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.</p> <p>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.</p>

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.
	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.	
Landfill Gas Sample Collection	Landfill Gas Exposure	LEL/O ₂ , H ₂ S, and PID monitoring devices are imperative during landfill gas sampling operations. Refer to HASP for air monitoring requirements for H ₂ 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.
		Ensure adequate facilities/equipment for hand washing prior to eating.
	Electrical shocks, cuts, bruises, fires, burns from Tool-Related use	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 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
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Review Related THA's –
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.
		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.
Conduct visual inspection of site	Dangerous Terrain	Be aware of the site terrain, watch for holes and rocks that can be tripping hazards
		Learn to identify and watch for plants such as thorn bushes and poison ivy that can either scratch you or give you a rash.
Collecting sample	Muscle strain from lifting heavy objects	Use proper lifting techniques. Use appropriate mechanical assistance and tools when possible. Wear work gloves and steel toed boots.
	Exposure to unknown sample	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	<p>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).</p> <p>Communicate Task Hazard Analysis and Lessons Learned information to operator(s) prior to initiating work and throughout the project as needed.</p>
Driving to site	<p>Vehicle accidents/collisions/injuries</p> <p>Backing collisions</p>	<p>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.</p> <p>Wear seat belts always when driving even on site.</p> <p>Secure loose materials in cab or bed of vehicle.</p> <p>Keep windshields, windows and lights cleans.</p> <p>Abide by safe driving procedures.</p> <p>If possible avoid backing by using a route that allows you to pull through.</p> <p>If backing up from a parked area do a quality 360 walker.</p>
Working within transportation corridors or active construction sites	Collisions injuries	<p>Wear high visibility safety vest on site when out of personal or GZA vehicle.</p> <p>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.</p> <p>Use emergency flashers or other appropriate vehicle warning system as appropriate to local conditions when parking vehicle.</p> <p>Use emergency flashers or other appropriate vehicle warning system when parking outside of standard parking spaces, or to stop in right-of-</p> <p>Be alert at all times; never step outside traffic cones.</p>



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.		
Working among hazardous biota	Plant toxins Incidental contact	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.
		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.
	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. 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). 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. Coordinate with local hospitals to verify they have proper anti-venom in stock. Learn first aid procedures in case of poisonous snake bite. Devise an action plan and include in the site-specific HASP.
	Wild Animals	Do NOT handle wildlife unless properly trained to do so. Beware of any wild animal that shows no sign of wariness of humans. Do NOT attempt to feed wild animals or to help apparently injured wild animals. 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	<p>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</p> <p>Seek shelter inside a walled building or your vehicle.</p> <p>Open picnic pavilions and under trees are not adequate shelters.</p> <p>Assess vulnerability to lightning strikes as soon as thunder is heard on the horizon. Open areas and higher elevations are more susceptible to strikes.</p> <p>Tall objects such as metal towers and flag poles may attract lightning.</p> <p>Consult internet weather radar tracking devices to learn of impending storm patterns proximal to your work area.</p>
	High Winds	<p>Avoid working at high elevations, elevated platforms, and other exposed areas during high wind conditions.</p> <p>Assess work area for equipment that may be blown down, over, or carried aloft by high winds.</p>
Working in areas without sanitary facilities	Hygiene related hazards	<p>Provide hand washing kits (e.g., baby wipes, hand sanitizers, paper towels, bottled water, etc.) to be used prior to eating and drinking.</p> <p>Have garbage bags handy to collect trash.</p>
Working in remote areas	Emergency Conditions	<p>Be familiar with onsite emergency procedures and route to nearest hospital.</p> <p>Have a first aid kit available; know its contents and how to use them.</p> <p>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.</p>
	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
		<p>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.</p> <p>Share your progress plan with office staff prior to entering the field.</p> <p>Check in with office personnel periodically to update progress.</p> <p>Review and comply with GZA's Working Alone Policy 03-1009 in advance of working alone on a project site.</p>
	Hunting	<p>Be familiar with the various game hunting seasons. Follow rules and guidelines for remaining visible to hunters.</p> <p>Try to plan work around active hunting seasons or daily peak hunting hours as warranted.</p>



**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

GHS product identifier	: Acetone
Chemical name	: acetone
Other means of identification	: propan-2-one; propanone; 2-Propanone; dimethyl ketone
Product use	: Synthetic/Analytical chemistry.
Synonym	: propan-2-one; propanone; 2-Propanone; dimethyl ketone
SDS #	: 001088
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 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 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

Response	: 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	: acetone
Other means of identification	: propan-2-one; propanone; 2-Propanone; dimethyl ketone

CAS number/other identifiers

CAS number	: 67-64-1
Product code	: 001088

Ingredient name	%	CAS number
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

Eye contact	: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
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 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, CO₂, 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>ACGIH TLV (United States, 3/2012). STEL: 1782 mg/m³ 15 minutes. STEL: 750 ppm 15 minutes. TWA: 1188 mg/m³ 8 hours. TWA: 500 ppm 8 hours.</p> <p>NIOSH REL (United States, 1/2013). TWA: 590 mg/m³ 10 hours. TWA: 250 ppm 10 hours.</p> <p>OSHA PEL (United States, 6/2010). TWA: 2400 mg/m³ 8 hours. TWA: 1000 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 2400 mg/m³ 15 minutes. STEL: 1000 ppm 15 minutes. TWA: 1800 mg/m³ 8 hours. 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** : C₃H₆O
- 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 ³ /lb)	: 1.2642
Gas Density (lb/ft ³)	: 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	Rat	59528 ppm	1 hours
	LD50 Oral	Rat	5800 mg/kg	-

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

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

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
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 _{ow}	BCF	Potential
acetone	-0.23	-	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

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






Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or 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 	3 	3 	3 	3 
Packing group	II	II	-	II	II
Environment	No.	No.	No.	No.	No.

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Section 14. Transport information

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

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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 \(U.S.A.\)](#)



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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 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

Date of issue/Date of revision	: 4/26/2015.	Date of previous issue	: 10/21/2014.	Version	: 0.02	13/14
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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

GHS product identifier	: Ethanol
Chemical name	: ethanol
Other means of identification	: ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)
Product use	: Synthetic/Analytical chemistry.
Synonym	: ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)
SDS #	: 001114
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

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.

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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, CO₂, 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	ACGIH TLV (United States, 3/2012). STEL: 1000 ppm 15 minutes. OSHA PEL 1989 (United States, 3/1989). TWA: 1000 ppm 8 hours. TWA: 1900 mg/m ³ 8 hours. NIOSH REL (United States, 1/2013). TWA: 1000 ppm 10 hours. TWA: 1900 mg/m ³ 10 hours.

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Section 8. Exposure controls/personal protection

OSHA PEL (United States, 6/2010).

TWA: 1000 ppm 8 hours.

TWA: 1900 mg/m³ 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 : C₂H₆O

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

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: 5/18/2015.

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: 10/28/2014.

Version : 0.02

5/12

Section 9. Physical and chemical properties

Melting/freezing point	: -114°C (-173.2°F)
Critical temperature	: Not available.
Odor	: Characteristic.
Odor threshold	: Not available.
pH	: Not available.
Flash point	: Closed cup: 9.7°C (49.5°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: 3.3% Upper: 19%
Vapor pressure	: 5.7 kPa (42.948650611 mm Hg) [room temperature]
Vapor density	: 1.6 (Air = 1)
Specific Volume (ft³/lb)	: 1.2716
Gas Density (lb/ft³)	: 0.7864 (25°C / 77 to °F)
Relative density	: 0.8
Solubility	: Not available.
Solubility in water	: 1000 g/l
Partition coefficient: n-octanol/water	: -0.35
Auto-ignition temperature	: 455°C (851°F)
Decomposition temperature	: Not available.
SADT	: Not available.
Viscosity	: Dynamic (room temperature): 0.544 to 0.59 mPa·s (0.544 to 0.59 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.
Incompatibility with various substances	: Highly reactive or incompatible with the following materials: oxidizing materials and alkalis.
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

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

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.
Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : 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 _{ow}	BCF	Potential
ethanol	-0.35	-	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations






Disposal methods : The generation of waste should be avoided or 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

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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
UN number	UN1170	UN1170	UN1170	UN1170	UN1170
UN proper shipping name	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
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	Limited quantity Yes. Packaging instruction Passenger aircraft Quantity limitation: 5 L Cargo aircraft Quantity limitation: 60 L Special provisions 24, IB2, T4, TP1	Explosive Limit and Limited Quantity Index 5 Passenger Carrying Road or Rail Index 60	-	-	Passenger and Cargo Aircraft Quantity limitation: 5 L Cargo Aircraft Only Quantity limitation: 60 L Limited Quantities - Passenger Aircraft 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 Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule I Chemicals

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons 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.)



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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.

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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.

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Section 2. Hazards identification

- Prevention** : 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, CO₂, 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 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 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>ACGIH TLV (United States, 32012). Absorbed through skin. TWA: 50 ppm 8 hours.</p> <p>MOSH / EL (United States, 12013). TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours.</p> <p>OSHA PEL (United States, 62010). TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 31989). TWA: 180 mg/m³ 8 hours. 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 ₆ H ₁₄
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% Upper: 7.5%
Vapor pressure	: 17 kPa (127.510360216 mm Hg) [room temperature]
Vapor density	: 3 (Air = 1)
Specific Volume (ft ³ /lb)	: 1.5138
Gas Density (lb/ft ³)	: 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.	Rat	48000 ppm	4 hours
	LC50 Inhalation Vapor	Rat	96000 ppm	1 hours
	LD50 Oral	Rat	15840 mg/kg	-

Irritation/Corrosion

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

Sensitization

Not available.

Reproductive toxicity

Not available.

Carcinogenicity

Not available.

Environmental 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

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Section 11. Toxicological information

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.
Ingestion	: Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

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

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

Potential immediate effects	: Not available.
Potential delayed effects	: Not available.

Potential chronic health effects

Not available.

General	: May cause damage to organs through prolonged or repeated exposure.
Carcinogenicity	: No known significant effects or critical hazards.
- utagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.
DeRelopmental effects	: No known significant effects or critical hazards.
Fertility effects	: 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	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 _{ow}	BCF	Potential
n-hexane	4	501.187	high

Volatility in soil







Soilwater partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or 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	UN - exico	I- DG	IATA
UN number	UN1208	UN1208	UN1208	UN1208	UN1208
UN proper shipping name	Hexanes	Hexanes	Hexanes	Hexanes	Hexanes
Transport hazard class(es)	3 	3 	3 	3  	3 

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Section 14. Transport information

Packing group	II	II	II	II	II
Environment	No.	No.	No.	Yes.	No.
Additional information	<u>Reportable quantity</u> 5000 lbs / 2270 kg [907.77 gal / 3436.3 L] 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> 1 <u>Passenger Carrying Ship Index</u> Forbidden <u>Passenger Carrying / Load or / Mail Index</u> 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 inRentry : This material is listed or exempted.

International regulations

- International lists : **Australia inRentry (AICS)**: This material is listed or exempted.
- China inRentry (IECSC)**: This material is listed or exempted.
- Japan inRentry**: This material is listed or exempted.
- Korea inRentry**: This material is listed or exempted.
- **alaysia InRentry (EHS / egister)**: Not determined.
- Mew Zealand InRentry of Chemicals (MZIoC)**: This material is listed or exempted.
- Philippines inRentry (PICCS)**: This material is listed or exempted.
- Taiwan inRentry (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 0-4 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 CFR 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.)



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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

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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)

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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/RCIS 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.

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Section 2. Hazards identification

- Response** : 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 and information on ingredients

- Substance or mixture** : Substance
- Chemical name** : Isopropyl alcohol
- Other means of identification** : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol

CAS number and other identifiers

- CAS number** : 67-63-0
- Product code** : 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

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

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, 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 controls/Personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
propan-2-ol	<p>ACGIH TLV (United States, 3R012). TWA: 200 ppm 8 hours. STEL: 400 ppm 15 minutes.</p> <p>OSHA PEL 1989 (United States, 3R989). TWA: 400 ppm 8 hours. TWA: 980 mg/m³ 8 hours. STEL: 500 ppm 15 minutes. STEL: 1225 mg/m³ 15 minutes.</p> <p>- IOSH / EL (United States, 1R013). TWA: 400 ppm 10 hours. TWA: 980 mg/m³ 10 hours. STEL: 500 ppm 15 minutes. STEL: 1225 mg/m³ 15 minutes.</p> <p>OSHA PEL (United States, 6R010). TWA: 400 ppm 8 hours. TWA: 980 mg/m³ 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 controls/Personal 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** : C₃H₈O
- 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 (ft³/lb)** : 1.2739
- Gas Density (lb/ft³)** : 0.785
- / Relative density** : 0.79

Section 9. Physical and chemical properties

Solubility	: Not available.
Solubility in water	: Not available.
Partition coefficient: nM octanol/water	: 0.05
Autoignition temperature	: 456°C (852.8°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	: 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.	Rat	45248 ppm	1 hours
	LD50 Dermal	Rabbit	12800 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-

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/Ingredient name	OSHA	IA/ C	- TP
propan-2-ol	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Chemical name	Category	Route 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

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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 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 _{ow}	BCF	Potential
propan-2-ol	0.05	-	low

Mobility in soil






Soil/water partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or 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
U- number	UN1219	UN1219	UN1219	UN1219	UN1219
U- proper shipping name	ISOPROPANOL OR ISOPROPYL ALCOHOL	ISOPROPANOL; OR ISOPROPYL ALCOHOL	ISOPROPANOL OR ISOPROPYL ALCOHOL	ISOPROPANOL (ISOPROPYL ALCOHOL)	ISOPROPANOL
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	<u>Limited quantity</u> Yes. <u>Packaging instruction</u> Passenger aircraft Quantity limitation: 5 L Cargo aircraft Quantity limitation: 60 L <u>Special provisions</u> IB2, T4, TP1	<u>Explosive Limit and Limited Quantity Index</u> 1 <u>Passenger Carrying / Load or / ail Index</u> 5	-	-	<u>Passenger and Cargo Aircraft</u> Quantity limitation: 5 L <u>Cargo Aircraft Only</u> Quantity limitation: 60 L <u>Limited Quantities M</u> <u>Passenger Aircraft</u> 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 (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

SA/ A 302~~R~~04

Composition~~R~~Information on ingredients

No products were found.

SA/ A 304 / Q : Not applicable.

SA/ A 311~~R~~12

Classification : Fire hazard
 Immediate (acute) health hazard

Composition~~R~~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	%
Form / M eporting requirements	Isopropyl alcohol	67-63-0	100
Supplier notification	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 Material 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

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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 - 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 Date of revision	: 5/20/2015.
Date of previous issue	: 10/28/2014.
Version	: 0.02
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

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 4th 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

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3.0	Integrated Safety Management System	8
4.0	Task Specific Hazard Evaluation and Controls	9
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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

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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).

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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.

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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., RWPs, 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.

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- 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.

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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 of chemicals to be potentially brought to the Subject Property the 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.

- *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

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- 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**

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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;

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- 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 ($\mu\text{g}/\text{m}^3$) 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 $\mu\text{g}/\text{m}^3$ 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 $\mu\text{g}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures

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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.

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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.

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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.

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- **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

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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@preferrredenv.com

Field Staff and SSHO

Chris Zweier cell: 516 729-3293

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EMERGENCY TELEPHONE NUMBERS

Police - 911

Fire Dept:

New York City Fire Department, Engine Company 319
78-11 67th 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.

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

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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.

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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.

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- 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 to NYC Health + Hospitals / Bellevue., 462 1st Ave., New York, NY 10016

Drive 3.7 miles, 23 min



Map data ©2023 Google 1000 ft

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 _____

Other Hazardous Activities - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations If there are none, write "None" here: _____

If yes, describe them here: _____

How will they be controlled? _____

Prewrite Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	<u>Doc #</u>		<u>Doc #</u>
<input type="checkbox"/> Not applicable	<u>Doc #</u>	<input type="checkbox"/> Working at Height	<input type="checkbox"/> Confined Space
<input type="checkbox"/> Energy Isolation (LOTO)	_____	<input type="checkbox"/> Excavation/Trenching	<input type="checkbox"/> Hot Work
<input type="checkbox"/> Mechanical Lifting Ops	_____	<input type="checkbox"/> Overhead & Buried Utilities	<input type="checkbox"/> Other permit

Discuss following questions (for some review previous day's post activities). **Check if yes :**

<input type="checkbox"/> Incidents from day before to review?	<input type="checkbox"/> Lessons learned from the day before?	<input type="checkbox"/> Topics from Corp H&S to cover?
<input type="checkbox"/> Any corrective actions from yesterday?	<input type="checkbox"/> Will any work deviate from plan?	<input type="checkbox"/> Any Stop Work Interventions yesterday?
<input type="checkbox"/> JLAS or procedures are available?	<input type="checkbox"/> Field teams to "dirty" JLAS, as needed?	<input type="checkbox"/> If deviations, notify PM & client
<input type="checkbox"/> Staff has appropriate PPE?	<input type="checkbox"/> Staff knows Emergency Plan (EAP)?	<input type="checkbox"/> All equipment checked & OK?
<input type="checkbox"/> Staff knows gathering points?		<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))

- Elimination
- Engineering controls
- General PPE Usage
- Personal Hygiene
- Emergency Action Plan (EAP)
- JLA to be developed/used *(specify)*

- Substitution
- Administrative controls
- Hearing Conservation
- Exposure Guidelines
- Fall Protection
- LPO conducted *(specify job/JLA)*

- Isolation
- Monitoring
- Respiratory Protection
- Decon Procedures
- Work Zones/Site Control
- Traffic Control
- Other *(specify)*

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

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

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&S at 1.720.344.3844.

In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

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&S at

Visitor Name/Co - not involved in work	
In	Out
In	Out
In	Out
In	Out

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.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB**, I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist 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.

Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

- Lessons learned and best practices learned today: _____
- Incidents that occurred today: _____
- Any Stop Work interventions today? _____
- Corrective/Preventive Actions needed for future work: _____
- Any other H&S issues: _____

Keep H&S 1 st 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.

Manufacturer/Importer/Supplier/Distributor information

Company Name RegenesiS
Address 1011 Calle Sombra
 San Clemente, CA 92673
Telephone 949-366-8000
E-mail CustomerService@regenesiS.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
Mixtures

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.

Skin contact	Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
Eye contact	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.
Ingestion	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.
Most important symptoms/effects, acute and delayed	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.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water spray. Carbon dioxide (CO2). Dry chemical powder. Foam.
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, phosphorus compounds and metal oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk. Water spray should be used to cool containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	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.
Methods and materials for containment and cleaning up	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. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	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.
Conditions for safe storage, including any incompatibilities	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.
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Hydrogen Release Compound (HRC®)

923939 Version #: 01 Revision date: - Issue date: 10-April-2015

SDS US

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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		
<i>Oral</i>		
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 Flammability: 1 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

GHS product identifier	: Acetone
Chemical name	: acetone
Other means of identification	: propan-2-one; propanone; 2-Propanone; dimethyl ketone
Product use	: Synthetic/Analytical chemistry.
Synonym	: propan-2-one; propanone; 2-Propanone; dimethyl ketone
SDS #	: 001088
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 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 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

Response	: 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	: acetone
Other means of identification	: propan-2-one; propanone; 2-Propanone; dimethyl ketone

CAS number/other identifiers

CAS number	: 67-64-1
Product code	: 001088

Ingredient name	%	CAS number
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

Eye contact	: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
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 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, CO₂, 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>ACGIH TLV (United States, 3/2012). STEL: 1782 mg/m³ 15 minutes. STEL: 750 ppm 15 minutes. TWA: 1188 mg/m³ 8 hours. TWA: 500 ppm 8 hours.</p> <p>NIOSH REL (United States, 1/2013). TWA: 590 mg/m³ 10 hours. TWA: 250 ppm 10 hours.</p> <p>OSHA PEL (United States, 6/2010). TWA: 2400 mg/m³ 8 hours. TWA: 1000 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 2400 mg/m³ 15 minutes. STEL: 1000 ppm 15 minutes. TWA: 1800 mg/m³ 8 hours. 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** : C₃H₆O
- 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 ³ /lb)	: 1.2642
Gas Density (lb/ft ³)	: 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	Rat	59528 ppm	1 hours
	LD50 Oral	Rat	5800 mg/kg	-

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

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

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
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 _{ow}	BCF	Potential
acetone	-0.23	-	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

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






Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or 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 	3 	3 	3 	3 
Packing group	II	II	-	II	II
Environment	No.	No.	No.	No.	No.

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Section 14. Transport information

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

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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 \(U.S.A.\)](#)



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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 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

Date of issue/Date of revision	: 4/26/2015.	Date of previous issue	: 10/21/2014.	Version	: 0.02	13/14
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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

GHS product identifier	: Ethanol
Chemical name	: ethanol
Other means of identification	: ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)
Product use	: Synthetic/Analytical chemistry.
Synonym	: ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)
SDS #	: 001114
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

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.

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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.
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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, CO₂, 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	ACGIH TLV (United States, 3/2012). STEL: 1000 ppm 15 minutes. OSHA PEL 1989 (United States, 3/1989). TWA: 1000 ppm 8 hours. TWA: 1900 mg/m ³ 8 hours. NIOSH REL (United States, 1/2013). TWA: 1000 ppm 10 hours. TWA: 1900 mg/m ³ 10 hours.

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Section 8. Exposure controls/personal protection

OSHA PEL (United States, 6/2010).

TWA: 1000 ppm 8 hours.

TWA: 1900 mg/m³ 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 : C₂H₆O

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

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Section 9. Physical and chemical properties

Melting/freezing point	: -114°C (-173.2°F)
Critical temperature	: Not available.
Odor	: Characteristic.
Odor threshold	: Not available.
pH	: Not available.
Flash point	: Closed cup: 9.7°C (49.5°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: 3.3% Upper: 19%
Vapor pressure	: 5.7 kPa (42.948650611 mm Hg) [room temperature]
Vapor density	: 1.6 (Air = 1)
Specific Volume (ft³/lb)	: 1.2716
Gas Density (lb/ft³)	: 0.7864 (25°C / 77 to °F)
Relative density	: 0.8
Solubility	: Not available.
Solubility in water	: 1000 g/l
Partition coefficient: n-octanol/water	: -0.35
Auto-ignition temperature	: 455°C (851°F)
Decomposition temperature	: Not available.
SADT	: Not available.
Viscosity	: Dynamic (room temperature): 0.544 to 0.59 mPa·s (0.544 to 0.59 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.
Incompatibility with various substances	: Highly reactive or incompatible with the following materials: oxidizing materials and alkalis.
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

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

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.
Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : 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 _{ow}	BCF	Potential
ethanol	-0.35	-	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations






Disposal methods : The generation of waste should be avoided or 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

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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
UN number	UN1170	UN1170	UN1170	UN1170	UN1170
UN proper shipping name	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
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	Limited quantity Yes. Packaging instruction Passenger aircraft Quantity limitation: 5 L Cargo aircraft Quantity limitation: 60 L Special provisions 24, IB2, T4, TP1	Explosive Limit and Limited Quantity Index 5 Passenger Carrying Road or Rail Index 60	-	-	Passenger and Cargo Aircraft Quantity limitation: 5 L Cargo Aircraft Only Quantity limitation: 60 L Limited Quantities - Passenger Aircraft 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 Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule I Chemicals

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons 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.)



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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.

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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.

Section 2. Hazards identification

- Prevention** : 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, CO₂, 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 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 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>ACGIH TLV (United States, 32012). Absorbed through skin. TWA: 50 ppm 8 hours.</p> <p>MOSH / EL (United States, 12013). TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours.</p> <p>OSHA PEL (United States, 62010). TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 31989). TWA: 180 mg/m³ 8 hours. 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.
- olecular weight	: 86.18 g/mole
- olecular formula	: C6-H14
Boiling\condensation point	: 68.73°C (155.7°F)
- elting\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 explosion (flammable) limits	: Lower: 1.1% Upper: 7.5%
Vapor pressure	: 17 kPa (127.510360216 mm Hg) [room temperature]
Vapor density	: 3 (Air = 1)
Specific Volume (ft ³ /lb)	: 1.5138
Gas Density (lb/ft ³)	: 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.	Rat	48000 ppm	4 hours
	LC50 Inhalation Vapor	Rat	96000 ppm	1 hours
	LD50 Oral	Rat	15840 mg/kg	-

Irritation/Corrosion

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

Sensitization

Not available.

- utagenicity

Not available.

Carcinogenicity

Not available.

/ eproductiRe toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	/ oute of exposure	Target organs
n-hexane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	/ oute 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

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Section 11. Toxicological information

- 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.
- Ingestion** : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

- 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

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

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

Potential chronic health effects

Not available.

- General** : May cause damage to organs through prolonged or repeated exposure.
- Carcinogenicity** : No known significant effects or critical hazards.
- utagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : No known significant effects or critical hazards.
- DeRelopmental effects** : No known significant effects or critical hazards.
- Fertility effects** : 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	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 _{ow}	BCF	Potential
n-hexane	4	501.187	high

Volatility in soil







Soilwater partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or 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	IMDG	I- DG	IATA
UN number	UN1208	UN1208	UN1208	UN1208	UN1208
UN proper shipping name	Hexanes	Hexanes	Hexanes	Hexanes	Hexanes
Transport hazard class(es)	3 	3 	3 	3  	3 

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Section 14. Transport information

Packing group	II	II	II	II	II
Environment	No.	No.	No.	Yes.	No.
Additional information	<u>Reportable quantity</u> 5000 lbs / 2270 kg [907.77 gal / 3436.3 L] 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> 1 <u>Passenger Carrying Ship Index</u> Forbidden <u>Passenger Carrying / Load or / Mail Index</u> 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 inRentry : This material is listed or exempted.

International regulations

- International lists : **Australia inRentry (AICS)**: This material is listed or exempted.
- China inRentry (IECSC)**: This material is listed or exempted.
- Japan inRentry**: This material is listed or exempted.
- Korea inRentry**: This material is listed or exempted.
- **alaysia InRentry (EHS / egister)**: Not determined.
- Mew Zealand InRentry of Chemicals (MZIoC)**: This material is listed or exempted.
- Philippines inRentry (PICCS)**: This material is listed or exempted.
- Taiwan inRentry (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 0-4 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 CFR 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.)



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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

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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)

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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/RCIS 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.

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Section 2. Hazards identification

- Response** : 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 and information on ingredients

- Substance or mixture** : Substance
- Chemical name** : Isopropyl alcohol
- Other means of identification** : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol

CAS number and other identifiers

- CAS number** : 67-63-0
- Product code** : 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

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

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, 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 controls/Personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
propan-2-ol	<p>ACGIH TLV (United States, 3R012). TWA: 200 ppm 8 hours. STEL: 400 ppm 15 minutes.</p> <p>OSHA PEL 1989 (United States, 3R989). TWA: 400 ppm 8 hours. TWA: 980 mg/m³ 8 hours. STEL: 500 ppm 15 minutes. STEL: 1225 mg/m³ 15 minutes.</p> <p>- IOSH / EL (United States, 1R013). TWA: 400 ppm 10 hours. TWA: 980 mg/m³ 10 hours. STEL: 500 ppm 15 minutes. STEL: 1225 mg/m³ 15 minutes.</p> <p>OSHA PEL (United States, 6R010). TWA: 400 ppm 8 hours. TWA: 980 mg/m³ 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 controls/Personal 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** : C₃H₈O
- 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 (ft³/lb)** : 1.2739
- Gas Density (lb/ft³)** : 0.785
- / Relative density** : 0.79

Section 9. Physical and chemical properties

Solubility	: Not available.
Solubility in water	: Not available.
Partition coefficient: nM octanol/water	: 0.05
Autoignition temperature	: 456°C (852.8°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	: 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.	Rat	45248 ppm	1 hours
	LD50 Dermal	Rabbit	12800 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-

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/Ingredient name	OSHA	IA/ C	- TP
propan-2-ol	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

name	Category	Route 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 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 _{ow}	BCF	Potential
propan-2-ol	0.05	-	low

Mobility in soil






Soil/water partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or 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
U- number	UN1219	UN1219	UN1219	UN1219	UN1219
U- proper shipping name	ISOPROPANOL OR ISOPROPYL ALCOHOL	ISOPROPANOL; OR ISOPROPYL ALCOHOL	ISOPROPANOL OR ISOPROPYL ALCOHOL	ISOPROPANOL (ISOPROPYL ALCOHOL)	ISOPROPANOL
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	<p><u>Limited quantity</u> Yes.</p> <p><u>Packaging instruction</u> Passenger aircraft Quantity limitation: 5 L</p> <p>Cargo aircraft Quantity limitation: 60 L</p> <p><u>Special provisions</u> IB2, T4, TP1</p>	<p><u>Explosive Limit and Limited Quantity Index</u> 1</p> <p><u>Passenger Carrying / load or / ail Index</u> 5</p>	-	-	<p><u>Passenger and Cargo Aircraft</u>Quantity limitation: 5 L</p> <p>Cargo Aircraft Only Quantity limitation: 60 L</p> <p>Limited Quantities M</p> <p>Passenger Aircraft Quantity limitation: 1 L</p>

“/ 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 (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

SA/ A 302~~R~~04

Composition~~R~~Information on ingredients

No products were found.

SA/ A 304 / Q : Not applicable.

SA/ A 311~~R~~12

Classification : Fire hazard
 Immediate (acute) health hazard

Composition~~R~~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	%
Form / M eporting requirements	Isopropyl alcohol	67-63-0	100
Supplier notification	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 Material 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

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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 - 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 Date of revision	: 5/20/2015.
Date of previous issue	: 10/28/2014.
Version	: 0.02
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

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

PART OF BODY INJURED

Abrasion _____ Fracture _____
Aspxiation _____ Laceration _____
Bite _____ Poisoning _____
Bruise _____ Puncture _____
Burn _____ Scalds _____
Concussion _____ Scratches _____
Cut _____ Shock (el.) _____
Dislocation _____ Sprain _____

Abdoman _____ Ankle (R / L)
Back _____ Arm (R / L)
Chest _____ Ear (R / L)
Face _____ Elbow (R / L)
Finger _____ Eye (R / L)
Head _____ Foot (R / L)
Mouth _____ Hand (R / L)
Nose _____ Knee (R / L)
Scalp _____ Leg (R / L)
Tooth _____ Wrist (R / L)

Other (specify) _____

Other (specify) _____

DESCRIPTION OF ACCIDENT

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.
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ENVIRONMENTAL
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MANAGEMENT

GZA GeoEnvironmental of
New York
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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 (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.



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

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

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/m³, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m³ 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



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
Summary of Samples Collected and Analytical Suites

Sample ID	Sample Interval (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
 Volatile Organic Compounds in Soil Samples
 Clay Street, Brooklyn NY

Sample ID York ID Client Matrix	UUSCO	RRUSCO	Protectio n of GW	SB-1 (0-2) 2380662-01		SB-1 (4-6) 2380662-02		SB-2 (0-2) 2380662-03		SB-2 (4-6) 2380662-04		SB-3 (0-2) 2380662-13		SB-3 (4-6) 2380662-14		SB-4 (0-2) 2380662-11		SB-4 (4-6) 2380662-12		SB-5 (0-2) 2380662-09		SB-5 (4-6) 2380662-10		SB-6 (0-2) 2380662-05		SB-6 (4-6) 2380662-06		SB-7 (0-2) 2380662-07		SB-7 (4-6) 2380662-08			
				Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q
VOA 8260 MASTER Dilution Factor	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		mg/Kg	
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	0.00230	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-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	0.00220	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	0.00440	U	0.00600	U	0.00440	U	0.00710	U	0.0200	U	0.0110	U	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	0.00440	U	0.00600	U	0.00440	U	0.00710	U	0.0200	U	0.0110	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.													

Table 3
Semi-Volatile Organic Compounds In Soil Samples
Clay Street, Brooklyn NY

Sample ID York ID Client Matrix	UUSCO	RRUSCO	Protection of GW	SB-1 (0-2) 23B0662-01 Soil		SB-1 (4-6) 23B0662-02 Soil		SB-2 (0-2) 23B0662-03 Soil		SB-2 (4-6) 23B0662-04 Soil		SB-3 (0-2) 23B0662-13 Soil		SB-3 (4-6) 23B0662-14 Soil		SB-4 (0-2) 23B0662-11 Soil		SB-4 (4-6) 23B0662-12 Soil		SB-5 (0-2) 23B0662-09 Soil		SB-5 (4-6) 23B0662-10 Soil		SB-6 (0-2) 23B0662-05 Soil		SB-6 (4-6) 23B0662-06 Soil		SB-7 (0-2) 23B0662-07 Soil		SB-7 (4-6) 23B0662-08 Soil				
				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	Result	Q	
Semi-Volatiles, 1,4-Dioxane 8270 SIM-5 Dilution Factor	mg/Kg	mg/Kg	mg/Kg																															
1,4-Dioxane	0.1	13	0.1	NT		NT		NT		NT		NT		0.0194	U	NT		NT		NT		NT		0.0194	U	NT		0.0194	U	NT		NT		NT
SVOA, 8270 MASTER Dilution Factor	mg/Kg	mg/Kg	mg/Kg																															
1,1-Biphenyl	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	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	0.0967	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	0.0485	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	0.0485	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	0.0485	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	0.0485	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	0.0485	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	0.0967	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	0.0485	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	0.0485	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	0.0485	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	0.0485	U	0.0470	U	0.0726	U	0.0521	U	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	0.0967	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	0.0485	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	0.0485	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	0.0485	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	0.0485	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	0.0485	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	0.0485	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	0.0967	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	0.0485	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	0.0485	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	0.0485	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	0.0967	U	0.0937	U	0.145	U	0.104	U	0.102	U	
4,6-Dinitro-2-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	0.0485	U	0.0470	U	0.0726	U	0.0521	U	0.0512	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	0.0485	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	0.0485	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	0.0485	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	0.0485	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	0.0967	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	0.0967	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	0.0485	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</													

Table 4
Inorganic Constituents In Soil Samples

Sample ID York ID Client Matrix	UUSCO	RRUSCO	Protection of GW	SB-1 (0-2) 23B0662-01 Soil		SB-1 (4-6) 23B0662-02 Soil		SB-2 (0-2) 23B0662-03 Soil		SB-2 (4-6) 23B0662-04 Soil		SB-3 (0-2) 23B0662-13 Soil		SB-3 (4-6) 23B0662-14 Soil		SB-4 (0-2) 23B0662-11 Soil		SB-4 (4-6) 23B0662-12 Soil		SB-5 (0-2) 23B0662-09 Soil		SB-5 (4-6) 23B0662-10 Soil		SB-6 (0-2) 23B0662-05 Soil		SB-6 (4-6) 23B0662-06 Soil		SB-7 (0-2) 23B0662-07 Soil		SB-7 (4-6) 23B0662-08 Soil					
				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	Result	Q	Result	Q
				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	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
Metals, Target Analyte																																			
Dilution Factor				1		1		1		1		1		1		1		1		1		1		1		1		1		1		1			
Aluminum	~	~	~	6,090		9,460		7,200		13,300		7,990		8,600		13,100		6,220		4,270		16,800		6,020		8,160		9,670		6,240					
Antimony	~	~	~	4.470		2.390	U	2.570	U	2.420	U	2.290	U	2.310	U	13.400	U	2.360	U	7.930	U	2.460	U	2.370	U	2.470	U	2.650	U	3.310	U				
Arsenic	13	16	16	7.060		4.270		7.500		3.460		8.050		3.970		15.300		3.980		3.660		3.660		4.680		5.880		11.500		1.540		U			
Barium	350	400	820	70.800		47.600		72.400		85.100		25.900		64.800		325		25.300		271		125		22.200		137		513		41.200		U			
Beryllium	7.2	72	47	0.790		0.919		0.896		1.640		0.719		1.110		3.380		0.635		0.614		1.810		0.543		0.583		1.160		1.300					
Cadmium	2.5	4.3	7.5	0.306		0.308		0.596		0.291		0.275	U	0.423	U	0.797	U	0.283	U	1.100	U	0.519	U	0.285	U	0.297	U	6.140	U	0.497					
Calcium	~	~	~	1,440	B	1,100	B	3,450	B	2,000	B	1,270	B	1,800	B	32,600	B	1,590	B	11,500	B	3,480	B	1,940	B	822	B	16,700	B	717	B				
Chromium	~	~	~	12.500		23.600		18.700		33.900		12.600		25.500		12		14.200		18.500		35		10.700		27.400		39		47.400					
Cobalt	~	~	~	18.600		11.100		9.600		16.300		7.740		13.200		19.600		4.950		8.190		19.800		4.050		5.320		12.300		11.300					
Copper	50	270	1720	62		21.300		115		27.500		13.400		19.800		128		17.100		311		36.700		15.700		50.300		303		39.300					
Iron	~	~	~	33,300		25,100		21,200		30,000		19,400		29,200		45,100		17,800		35,700		32,400		12,700		18,300		28,000		44,800					
Lead	63	400	450	359		15.900		327		17.800		26.900		16.100		1,720		18.200		1,980		22.700		125		392		6,870		27.800					
Magnesium	~	~	~	2,030		3,270		2,640		5,510		2,210		3,870		1,160		2,180		1,940		7,160		2,170		2,750		3,100		1,720					
Manganese	1600	2000	2000	552		692		402		377		136		363		418		137		309		824		68.600		109		3,260		446					
Nickel	30	310	130	36.800		25.100		16		27		10.800		19.700		29.200		10.400		20.100		32		9.960		13.700		30.700		24.800					
Potassium	~	~	~	1,050		1,310		1,480		3,150		990	B	2,190	B	1,440	B	984	B	780	B	3,830	B	1,370	B	1,020	B	2,110	B	1,160	B				
Selenium	3.9	180	4	2.350	U	2.390	U	2.570	U	2.420	U	2.290	U	2.310	U	2.500	U	2.360	U	2.430	U	2.460	U	2.370	U	2.470	U	2.600	U	2.560	U				
Silver	2	180	8.3	0.473	U	0.481	U	0.518	U	0.489	U	0.462	U	0.465	U	0.505	U	0.476	U	0.490	U	0.495	U	0.478	U	0.499	U	0.525	U	0.516	U				
Sodium	~	~	~	165		108		376		294		111		96		595		85.200		205		173		160		101		557		68.300					
Thallium	~	~	~	2.350	U	2.390	U	2.570	U	2.420	U	2.290	U	2.310	U	2.500	U	2.360	U	2.430	U	2.460	U	2.370	U	2.470	U	2.600	U	2.560	U				
Vanadium	~	~	~	22.400		32.100		33.300		45.100		19.900		38.800		22.700		20.200		16		51.600		15.600		23.800		38.400		79.900					
Zinc	109	10000	2480	81.500		39.500		497		85.200		39		68.300		67.900		36.400		404		117		47.500		87.900		1,400		125					
Mercury by 7470/7471																																			
Dilution Factor				1		1		1		1		1		1		1		1		5		1		1		1		1		1					
Mercury	0.18	0.81	0.73	0.0372	U	0.0378	U	0.0407	U	0.0384	U	0.0363	U	0.0365	U	0.0960	U	0.0374	U	0.193	U	0.0389	U	0.0376	U	0.0392	U	0.0412	U	0.0406	U				

NOTES:
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 5
Pesticides, PCBs and PFAS in Soil Samples
Clay Street, Brooklyn NY

Sample ID	UUSCO	RRUSCO	Protection of GW	SB-1 (0-2) 23B0662-01	SB-1 (4-6) 23B0662-02	SB-2 (0-2) 23B0662-03	SB-2 (4-6) 23B0662-04	SB-3 (0-2) 23B0662-13	SB-3 (4-6) 23B0662-14	SB-4 (0-2) 23B0662-11	SB-4 (4-6) 23B0662-12	SB-5 (0-2) 23B0662-09	SB-5 (4-6) 23B0662-10	SB-6 (0-2) 23B0662-05	SB-6 (4-6) 23B0662-06	SB-7 (0-2) 23B0662-07	SB-7 (4-6) 23B0662-08
Client Matrix				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Compound	mg/Kg	mg/Kg	mg/Kg	Result	Q	Result	Q	Result	Q	Result	Q	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				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
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
4,4'-DDE [2C]	~	~	~	NT		NT		NT		NT		NT		NT		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
4,4'-DDT [2C]	~	~	~	NT		NT		NT		NT		NT		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
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
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
alpha-Chlordane [2C]	~	~	~	NT		NT		NT		NT		NT		NT		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
Chlordane, total	~	~	~	0.0368	U	0.0374	U	0.0403	U	0.0380	U	0.0359	U	0.0362	U	0.0393	U
Chlordane, total [2C]	~	~	~	NT		NT		NT		NT		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
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
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
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
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
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
Endrin aldehyde	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U	0.00181	U	0.00196	U
Endrin ketone	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U	0.00181	U	0.00196	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
gamma-Chlordane	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U	0.00181	U	0.00196	U
gamma-Chlordane [2C]	~	~	~	NT		NT		NT		NT		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
Heptachlor epoxide	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U	0.00181	U	0.00196	U
Methoxychlor	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U	0.00181	U	0.00196	U
Toxaphene	~	~	~	0.184	U	0.187	U	0.202	U	0.190	U	0.180	U	0.181	U	0.196	U
Total Solids				%		%		%		%		%		%		%	
Dilution Factor	~	~	~	1		1		1		1		1		1		1	
% Solids	~	~	~	88.700		87.300		81		85.900		91		90.300		83.200	
PCB, 8082 MASTER				mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor				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
Aroclor 1221	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1232	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1242	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1248	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1254	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1260	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1262	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Aroclor 1268	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
Total PCBs	0.1	1	3.2	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U	0.0183	U	0.0198	U
PFAS, NYSDEC Target List				mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Dilution Factor				5		5		5		5		5		5		5	
1H,1H,2H,2H-Perfluorodecanesulfonic acid	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
1H,1H,2H,2H-Perfluorooctanesulfonic acid	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
N-EtFOSAA	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
N-MeFOSAA	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorobutanesulfonic acid (PFBS)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorodecanoic acid (PFDA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorododecanoic acid (PFDoA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorohexadecanoic acid (PFHxS)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorohexanoic acid (PFHxA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorooctanoic acid (PFOA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorononanoic acid (PFNA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorooctanesulfonic acid (PFOS)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorotetradecanoic acid (PFTA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoropentanoic acid (PFPeA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorotridecanoic acid (PFTDA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoroundecanoic acid (PFUNA)	~	~	~	NT		NT		NT		NT		0.00142	U	NT		NT	

NOTES:
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

Table 6
Volatile Organic Compounds Detected in Soil
Commercial Street, Brooklyn NY

Sample ID York ID Sampling Date Client Matrix	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Restricted Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Protection of GWs	SB-8 (0-2") 2380727-05 2/13/2023 10:10:00 AM Soil		SB-8 (4-6") 2380727-06 2/13/2023 10:38:00 AM Soil		SB-9 (0-2") 2380727-01 2/13/2023 9:35:00 AM Soil		SB-9 (4-6") 2380727-02 2/13/2023 9:35:00 AM Soil		SB-10 (0-2") 2380727-03 2/13/2023 9:45:00 AM Soil		SB-10 (4-6") 2380727-04 2/13/2023 9:45:00 AM Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
				mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1	mg/Kg 1
V0A, #260 MASTER Dilution Factor															
1,1,1,2-Tetrachloroethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1,1-Trichloroethane	0.68	100	0.68	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1,2,2-Tetrachloroethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1,2-Trichloroethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1-Dichloroethane	0.27	26	0.27	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1-Dichloroethylene	0.33	100	0.33	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,1-Dichloropropylene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2,3-Trichlorobenzene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2,3-Trichloropropane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2,4,5-Tetramethylbenzene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2,4-Trichlorobenzene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2-Dibromo-3-chloropropane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2-Dibromoethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2-Dichlorobenzene	1.1	100	1.1	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2-Dichloroethane	0.02	3.1	0.02	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,2-Dichloropropane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,3-Dichlorobenzene	2.4	49	2.4	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,3-Dichloropropane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,4-Dichlorobenzene	1.8	13	1.8	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
1,4-Dioxane	0.1	13	0.1	0.0390	U	0.160	U	0.0600	U	0.0530	U	0.0690	U	0.0630	U
2,2-Dichloropropane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
2-Butanone	0.12	100	0.12	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
2-Chloroethylvinyl ether	--	--	--	0.0190	U	0.0320	U	0.0120	U	0.0110	U	0.0140	U	0.0130	U
2-Chlorotoluene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
2-Hexanone	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
4-Chlorotoluene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
4-Methyl-2-pentanone	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Acetone	0.05	100	0.05	0.0930	U	0.0280	J	0.00600	U	0.00640	U	0.0220	U	0.00630	U
Acrolein	--	--	--	0.00930	U	0.0160	U	0.00600	U	0.00530	U	0.00690	U	0.00630	U
Acrylonitrile	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Benzene	0.06	4.8	0.06	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Bromobenzene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Bromochloromethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Bromodichloromethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Bromoform	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Bromomethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Carbon disulfide	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Carbon tetrachloride	0.76	2.4	0.76	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Chlorobenzene	1.1	100	1.1	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Chloroethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Chloroform	0.37	49	0.37	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Chloromethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0320	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
cis-1,3-Dichloropropylene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Cyclohexane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Dibromochloromethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Dibromomethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Dichlorodifluoromethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Diisopropyl ether (DIPE)	--	--	--	0.00750	U	0.0130	U	0.00480	U	0.00550	U	0.00500	U	0.00500	U
Ethanol	--	--	--	0.0750	U	0.130	U	0.0480	U	0.0420	U	0.0550	U	0.0500	U
Ethyl Benzene	1	41	1	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Ethyl tert-butyl ether (ETBE)	--	--	--	0.00750	U	0.0130	U	0.00480	U	0.00420	U	0.00550	U	0.00500	U
Hexachlorobutadiene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Iodomethane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Isopropylbenzene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Methyl acetate	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Methyl Methacrylate	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Methylcyclohexane	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
Methylene chloride	0.05	100	0.05	0.0130	J	0.0310	J	0.00600	U	0.00790	J	0.0120	J	0.0120	J
Naphthalene	12	100	12	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
n-Butylbenzene	12	100	12	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
n-Propylbenzene	3.9	100	3.9	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
o-Xylene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
p- & m- Xylenes	--	--	--	0.00930	U	0.0160	U	0.00600	U	0.00530	U	0.00690	U	0.00630	U
p-Diethylbenzene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
p-Ethyltoluene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
p-Isopropyltoluene	--	--	--	0.00470	U	0.00800	U	0.00300	U	0.00260	U	0.00340	U	0.00310	U
sec-Butylbenzene	11	100	11												

Table 7
Semi-Volatile Organic Compounds Detected in Soil
Commercial Street, Brooklyn NY

Sample ID York ID Sampling Date Client Matrix	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Protection of GW	SB-8 (0-2)		SB-8 (4-6)		SB-9 (0-2)		SB-9 (4-6)		SB-10 (0-2)		SB-10 (4-6)	
				2380727-05		2380727-06		2380727-01		2380727-02		2380727-03		2380727-04	
				2/13/2023 10:00 AM	Soil	2/13/2023 10:00 AM	Soil	2/13/2023 9:00 AM	Soil	2/13/2023 9:00 AM	Soil	2/13/2023 9:00 AM	Soil	2/13/2023 9:00 AM	Soil
Compound	mg/Kg	mg/Kg	mg/Kg	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semi-Volatiles, 1,4 Dioxane B270 SIM Soil	mg/Kg	mg/Kg	mg/Kg												
1,4-Dioxane	0.1	13	0.1	NT		NT		NT		NT		NT		0.0190	
BVOA, B270 MASTER	mg/Kg	mg/Kg	mg/Kg	25		2		2		2		2		2	
1,1-Biphenyl	--	--	--	0.344	D	0.0502	U	0.0891	U	0.0488	U	0.0484	U	0.0527	U
1,2,4,5-Tetrachlorobenzene	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
1,2,4-Trichlorobenzene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,2-Diphenylhydrazine (as Azobenzene)	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,3,4,6-Tetrachlorophenol	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
2,4,5-Trichlorophenol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4,6-Trichlorophenol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4-Dichlorophenol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4-Dimethylphenol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4-Dinitrophenol	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
2,4-Dinitrotoluene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,6-Dinitrotoluene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Chloronaphthalene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Chlorophenol	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
2-Methylnaphthalene	--	--	--	1.480	D	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Methylphenol	0.33	100	0.33	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Nitroaniline	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
2-Nitrophenol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
3-, 4-, & 4-Methylphenols	0.33	100	0.33	0.0992	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
3,3'-Dichlorobenzidine	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
3-Nitroaniline	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
4-(6-Dinitro-3-methylphenol	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
4-Bromophenyl phenyl ether	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Chloro-3-methylphenol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Chloroaniline	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Chlorophenyl phenyl ether	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Nitroaniline	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
4-Nitrophenol	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
Acenaphthene	20	100	98	2.020	D	0.0502	U	0.0480	U	0.0488	U	0.0484	U	0.0527	U
Acenaphthylene	100	100	107	0.273	D	0.0502	U	0.0716	U	0.0488	U	0.0484	U	0.0527	U
Acetophenone	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Aniline	--	--	--	0.256	U	0.201	U	0.191	U	0.195	U	0.211	U	0.211	U
Anthracene	100	100	1000	5.900	D	0.0502	U	0.150	D	0.0488	U	0.0484	U	0.0527	U
Azaxine	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzaldehyde	--	--	--	0.469	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzidine	--	--	--	0.256	U	0.201	U	0.191	U	0.195	U	0.211	U	0.211	U
Benzofluoranthene	--	--	--	1.1	1	0.0502	U	0.454	D	0.0488	U	0.0776	U	0.0527	U
Benzopyrene	1	1	22	8.130	D	0.0502	U	0.436	D	0.0488	U	0.0484	U	0.0527	U
Benzofluoranthene	1	1	1.7	6.130	D	0.0502	U	0.441	D	0.0488	U	0.0484	U	0.0527	U
Benzofluoranthene	100	100	1000	4.150	D	0.0502	U	0.251	D	0.0488	U	0.0484	U	0.0527	U
Benzofluoranthene	0.8	3.9	1.7	7.640	D	0.0502	U	0.381	D	0.0488	U	0.0484	U	0.0527	U
Benzonic acid	--	--	--	0.135	D	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzyl alcohol	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzyl butyl phthalate	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bi(2-chloroethoxy)methane	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bi(2-chloroethyl)ether	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bi(2-chloroisopropyl)ether	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bi(2-ethylhexyl)phthalate	--	--	--	0.259	D	0.0502	U	0.0477	U	0.0488	U	0.119	D	0.0527	U
Caprotactam	--	--	--	0.128	U	0.100	U	0.0953	U	0.0974	U	0.0966	U	0.105	U
Carbazole	--	--	--	2.290	D	0.0502	U	0.0716	U	0.0488	U	0.0484	U	0.0527	U
Chrysene	1	3.9	1	9.060	D	0.0502	U	0.483	D	0.0488	U	0.0778	U	0.0527	U
Dibenzofluoranthene	0.33	100	1000	3.270	D	0.0502	U	0.0944	U	0.0488	U	0.0484	U	0.0527	U
Dibenzofuran	7	210	210	3.070	D	0.0502	U	0.0525	U	0.0488	U	0.0484	U	0.0527	U
Diethyl phthalate	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Dimethyl phthalate	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Di-n-butyl phthalate	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Di-n-octyl phthalate	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Fluoranthene	100	100	1000	20.500	D	0.0502	U	0.898	D	0.0488	U	0.119	D	0.0527	U
Fluorene	30	100	386	2.190	D	0.0502	U	0.0480	U	0.0488	U	0.0484	U	0.0527	U
Hexachlorobenzene	0.33	1.2	3.2	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Hexachlorobutadiene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Hexachlorocyclopentadiene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Hexachloroethane	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	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	0.0484	U	0.0527	U
Isoaphorone	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Naphthalene	12	100	12	2.830	D	0.0502	U	0.495	D	0.0488	U	0.0484	U	0.0527	U
Nitrobenzene	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
N-Nitrosodimethylamine	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
N-Nitrosodipropylamine	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
N-Nitrosodiphenylamine	--	--	--	0.0641	U	0.0502	U	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Perchlorophenol	0.8	6.7	0.8	0.0641	U	0.0502	U	0.0477							

Table 8
Inorganic Constituents Detected in Soil
Commercial Street, Brooklyn NY

Sample ID York ID Sampling Date Client Matrix	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Restricted Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives- Protection of GW	SB-8 (0-2') 23B0727-05 2/13/2023 10:10:00 AM		SB-8 (4-6') 23B0727-06 2/13/2023 10:38:00 AM		SB-9 (0-2') 23B0727-01 2/13/2023 9:05:00 AM		SB-9 (4-6') 23B0727-02 2/13/2023 9:15:00 AM		SB-10 (0-2') 23B0727-03 2/13/2023 9:35:00 AM		SB-10 (4-6') 23B0727-04 2/13/2023 9:40:00 AM	
				Soil	Q	Soil	Q	Soil	Q	Soil	Q	Soil	Q	Soil	Q
Metals, Target Analyte	mg/Kg	mg/Kg	mg/Kg	mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg		mg/Kg	
Dilution Factor															
Aluminum	~	~	~	2,620		788		1,290		8,330		478		610	
Antimony	~	~	~	8.800		2.690		4.900		2.440	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	U	0.299		0.293	U	0.410		0.317	U
Calcium	~	~	~	4,630	B	172	B	830		536	B	544		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	U	46.500		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	U	2.410	U	2.440	U	2.470	U	2.640	U
Silver	2	180	8.3	0.646	U	0.506	U	0.486	U	0.492	U	0.498	U	0.533	U
Sodium	~	~	~	82.800		1,710		657		51.200		1,940		3,120	
Thallium	~	~	~	3.200	U	2.510	U	2.410	U	2.440	U	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															
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 York ID Sampling Date Client Matrix	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives - Restricted Residential	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives- Protection of GW	SB-8 (0-2') 2380727-05		SB-8 (4-6') 2380727-06		SB-9 (0-2') 2380727-01		SB-9 (4-6') 2380727-02		SB-10 (0-2') 2380727-03		SB-10 (4-6') 2380727-04	
				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	
				Soil		Soil		Soil		Soil		Soil		Soil	
Compound	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
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	
Dilution Factor															
4,4'-DDD	0.0033	13	14	0.00253	U	0.00198	U	NT	UP	0.00193	U	NT	UP	0.00207	
4,4'-DDD [2C]	~	~	17	~	~	NT	~	0.00188	U	NT	U	0.00195	U	NT	
4,4'-DDE	0.0033	8.9	~	0.956	D	0.00995	D	0.00234	D	0.00193	U	0.00264	D	0.00207	
4,4'-DDT	0.0033	7.9	136	0.307	DP	0.0230	D	0.00781	D	0.00193	U	0.00565	D	0.00207	
Aldrin	0.005	0.097	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
alpha-BHC	0.02	0.48	0.19	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
alpha-Chlordane	0.094	4.2	0.02	0.00253	U	0.00198	U	NT	U	0.00193	U	0.00195	U	0.00207	
alpha-Chlordane [2C]	~	~	2.9	~	~	NT	~	0.00188	UP	NT	U	NT	UP	NT	
beta-BHC	0.036	0.36	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Chlordane, total	~	~	0.09	0.0506	U	0.0396	U	~	U	0.0386	U	~	U	0.0413	
Chlordane, total [2C]	~	~	~	~	~	NT	~	0.0376	UP	NT	U	0.0390	UP	NT	
delta-BHC	0.04	100	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Dieldrin	0.005	0.2	0.25	0.369	DP	~	~	NT	U	0.00193	U	0.00195	UP	0.00207	
Dieldrin [2C]	~	~	0.1	~	~	NT	~	0.00248	D	0.00188	UP	NT	~	NT	
Endosulfan I	2.4	24	102	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Endosulfan II	2.4	24	102	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Endosulfan sulfate	2.4	24	1000	0.00253	U	0.00198	U	1.00188	U	0.00193	U	0.00195	U	0.00207	
Endrin	0.014	11	0.06	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Endrin aldehyde	~	~	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Endrin ketone	~	~	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
gamma-Chlordane	~	~	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
gamma-Chlordane [2C]	~	~	~	~	~	NT	~	~	UP	NT	U	NT	UP	NT	
Heptachlor	0.042	2.1	0.38	0.00253	U	0.00198	UP	0.00188	U	0.00193	U	0.00195	U	0.00207	
Heptachlor epoxide	~	~	~	0.178	DP	0.00198	UP	0.00188	U	0.00193	U	0.00195	U	0.00207	
Methoxychlor	~	~	~	0.00253	U	0.00198	U	0.00188	U	0.00193	U	0.00195	U	0.00207	
Toxaphene	~	~	~	0.253	U	0.198	U	0.188	U	0.193	U	0.195	U	0.207	
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	
Dilution Factor															
Aroclor 1016	~	~	~	10	U	1	U	1	U	1	U	1	U	1	
Aroclor 1221	~	~	~	0.255	U	0.0200	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1232	~	~	~	0.255	U	0.0200	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1242	~	~	~	0.255	U	0.0200	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1248	~	~	~	0.255	U	0.0200	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1254	~	~	~	7.930	D	0.438	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1260	~	~	~	0.255	U	0.0200	U	0.0321	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1262	~	~	~	0.255	U	0.0200	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Aroclor 1268	~	~	~	0.255	U	0.0200	U	0.0190	U	0.0195	U	0.0197	U	0.0209	
Total PCBs	0.1	1	3.2	7.930	D	0.438	U	0.0321	U	0.0195	U	0.0197	U	0.0209	
PFAS, NYSDC Target List														ug/Kg	
Dilution Factor														1	
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FT)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FT)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
N-EtFOSAA	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
N-MeFOSAA	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorobutanesulfonic acid (PFBS)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorodecanoic acid (PFDA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorododecanoic acid (PFDoA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorohexanoic acid (PFHxA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorohexanoic acid (PFHxA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluoro-n-butanolic acid (PFBA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorononanoic acid (PFNA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorooctanesulfonic acid (PFOS)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorooctanoic acid (PFDA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluoropentanoic acid (PFPeA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorotetradecanoic acid (PFTA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluorotridecanoic acid (PFTDA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	
Perfluoroundecanoic acid (PFUnA)	~	~	~	~	~	NT	~	NT	~	NT	~	NT	~	0.298	

NOTES:
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~=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 York ID	NYSDEC TOGS Standards and Guidance Values - GA	GW-1 23B0854-01 Clay St. Water		GW-2 23B0854-03 Clay St. Water		GW-3 23B0854-02 Clay St. Water		GW-X 23B0854-04 Clay St. Water		GW-4 23B0727-09 Commercial St. Water		GW-5 23B0727-08 Commercial St. Water		S-FB-1 23B0854-05 Water		GW-FB-1 23B0854-06 Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Compound	ug/L																
VOC, 8260 LOW MASTER																	
Dilution Factor	200			1		1		1		1		1		1		1	
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U	0.216	U	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	0.266	U	0.266	U	0.266	U	0.266	U
1,1,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U	0.256	U	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	0.286	U	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	1.380	U	0.249	U	0.249	U	0.249	U	0.249	U	0.249	U	0.249	U	0.249	U
1,1-Dichloroethane	5	0.650	U	0.272	U	0.272	U	0.272	U	0.272	U	0.272	U	0.272	U	0.272	U
1,1-Dichloroethylene	5	11.200	U	0.327	U	0.327	U	0.327	U	0.327	U	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	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	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	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	0.310	U	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	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	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	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	0.377	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	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	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	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	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	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	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	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	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	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	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	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	0.422	U	0.422	U	0.422	U	0.422	U
Benzene	1	0.279	U	0.279	U	0.279	U	0.279	U	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	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	0.245	U	0.245	U	0.245	U	0.245	U
Bromofarm	50	0.163	U	0.163	U	0.163	U	0.163	U	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	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	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	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	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	0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	12	U	0.243	J	0.370	J	0.370	J	0.370	J	0.243	J	0.243	J	0.243	J
Chloromethane	5	0.372	U	0.372	U	0.372	U	0.372	U	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	J	0.740	J	1.990	J	10.400	J	0.294	J	0.294	J
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U	0.262	U	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	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	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	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	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	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	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	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	0.442	U	0.442	U	0.442	U	0.442	U
Methyl tert-butyl ether (MTBE)	10	0.244	U	0.244	U	0.300	U	2.350	U	0.244	U	0.360	J	0.244	U	0.244	U
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U	0.477	U	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	0.397	U	0.397	U	0.397	U	0.397	U
Naphthalene	10	0.560	J	0.590	J	0.212	J	0.212	J	0.212	J	0.212	J	0.212	J	0.212	J
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U	0.399	U	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	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	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	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	0.341	U	0.450	J	0.341	U	0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.200	U	0.200	U	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	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	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	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	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	0.367	U	0.367	U	0.367	U	0.367	U
Tetrachloroethylene	5	6.280	U	0.239	U	0.239	U	0.239	U	0.239	U	0.239	U	0.239	U	0.239	U
Toluene	5	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	42.600	U	0.279	U	0.279	U	0.279	U	0.279	U	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	0.229	U	0.229	U	0.229	U	0.229	U
Trichloroethylene	5	6.370	D														

**Table 11
Semi-Volatile Organic Compounds in Groundwater
Clay Street, Brooklyn NY**

Sample ID York ID Sampling Location Client Matrix	NYSDCE TOGS Standards and Guidance Values - GA	GW-1 2380854-01 Clay St. Water		GW-2 2380854-03 Clay St. Water		GW-3 2380854-02 Clay St. Water		GW-X 2380854-04 Clay St. Water		GW-5 2380727-08 Commercial St Water		GW-4 2380727-09 Commercial St Water		S-FB-1 2380854-05 Water		GW-FB-1 2380854-06 Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Semi-Volatiles, 1,4-Dioxane S270 SIM-Aqueous																	
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 S270 LOW MASTER																	
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
2,3,5-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	~	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
Benzic 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	1.320	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	~	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
Hisachlorocyclopentadiene	~	5.410	U	5.880	U	5.260	U	5.410	U	5.410	U	5.260	U	6.670	U	9.090	U
Isoophorone	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 S270 SIM MASTER																	
Dilution Factor	ug/L	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
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	0.657	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(k)fluoranthene	~	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																	

**Table 12
Inorganic Constituents in Groundwater
Clay Street, Brooklyn NY**

Sample ID York ID Sampling Location Client Matrix	NYSDCC TOGS Standards and Guidance Values - GA	GW-1 2380854-01 Clay St. Water		GW-2 2380854-03 Clay St. Water		GW-3 2380854-02 Clay St. Water		GW-X 2380854-04 Clay St. Water		GW-5 2380727-08 Commercial St. Water		GW-4 2380727-09 Commercial St. Water		S-FB-1 2380854-05 Water		GW-FB-1 2380854-06 Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Metals, Target Analyte, ICP		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Dilution Factor		1		2		1		1		1		1		1		1	
Aluminum	~	94,200		64,600		196		456		7,860		2,220		55,600	U	55,600	U
Barium	1000	61,700		423		98,800		203,000		272		62,500	U	27,800	U	27,800	U
Calcium	~	107,000	B	274,000	B	202,000	B	203,000	B	62,800	B	45,900	B	189	B	189	B
Chromium	50	5,560	U	165	U	5,560	U	5,560	U	29,400	U	12,500	U	5,560	U	5,560	U
Cobalt	~	4,440	U	90,800		4,440	U	4,440	U	7,270	U	10	U	4,440	U	4,440	U
Copper	200	22,200	U	319	U	22,200	U	22,200	U	49,100	U	50	U	22,200	U	22,200	U
Iron	~	278	U	155,000	D	437		1,140		29,700		6,140		278		278	
Lead	25	5,560	U	159	U	5,560	U	5,560	U	75,400	U	12,500	U	5,560	U	5,560	U
Magnesium	35000	31,100		60,500		40,300		38,300		5,730		4,700		55,600	U	55,600	U
Manganese	300	586		3,700		1,080		1,000		660		225		5,560	U	5,560	U
Nickel	100	11,100	U	168	U	11,100	U	11,100	U	31,500	U	25	U	11,100	U	11,100	U
Potassium	~	7,730		41,900		4,860		5,040		16,300		15,000		163		132	
Silver	50	5,560	U	5,560	U	5,560	U	5,560	U	5,560	U	12,500	U	5,560	U	5,560	U
Sodium	20000	124,000		93,400		189,000		186,000		13,900		29,700		556		556	
Vanadium	~	11,100	U	217	U	11,100	U	11,100	U	23,900	U	25	U	11,100	U	11,100	U
Zinc	2000	27,800	U	535	U	27,800	U	27,800	U	197	U	219	U	27,800	U	27,800	U
Metals, Target Analyte, ICP Dissolved		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	
Aluminum	~	124		7,850		174		196		1,740	B	477	B	55,600	U	55,600	U
Barium	1000	68,300		71,300		107		106		237		27,800	U	27,800	U	27,800	U
Calcium	~	107,000	B	275,000	B	208,000	B	202,000	B	68,200	B	49,700	B	105	B	105	B
Chromium	50	5,560	U	17,500	U	5,560	U	5,560	U	16,700	U	5,560	U	5,560	U	5,560	U
Cobalt	~	4,440	U	42,200	U	4,440	U	4,440	U	10	U	4,440	U	4,440	U	4,440	U
Copper	200	22,200	U	230	U	22,200	U	22,200	U	50	U	22,200	U	22,200	U	22,200	U
Iron	~	278	U	17,800		356		278		23,800		1,160		278		278	
Lead	25	6,800	U	86,600	U	5,560	U	5,560	U	69	U	5,560	U	5,560	U	5,560	U
Magnesium	35000	33,500		39,000		41,900		41,700		5,240		4,840		55,600	U	55,600	U
Manganese	300	638		3,180		1,150		1,120		700		230		5,560	U	5,560	U
Nickel	100	11,100	U	52,200	U	11,100	U	11,100	U	26	U	13,600	U	11,100	U	11,100	U
Potassium	~	8,670		30,100		5,480		5,150		16,000		55,600		55,600	U	55,600	U
Silver	50	5,560	U	5,560	U	5,560	U	5,560	U	12,500	U	5,560	U	5,560	U	5,560	U
Sodium	20000	126,000		94,200		196,000		189,000		14,700		31,900		556		556	
Vanadium	~	11,100	U	47,500	U	11,100	U	11,100	U	25	U	11,100	U	11,100	U	11,100	U
Zinc	2000	51,900	U	193	U	27,800	U	27,800	U	200	U	230	U	27,800	U	27,800	U
Metals, Target Analyte, ICPM5		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	
Antimony	3	1,110	U	1,110	U	1,110	U	1,110	U	2	U	2,500	U	1,110	U	1,110	U
Arsenic	25	1,110	U	7,540	U	1,110	U	1,110	U	9,230	U	2,500	U	1,110	U	1,110	U
Beryllium	3	0.333	U	1,240	U	0.333	U	0.333	U	0.642	U	0.750	U	0.333	U	0.333	U
Cadmium	5	0.556	U	0.821	U	0.556	U	0.556	U	1	U	1.250	U	0.556	U	0.556	U
Selenium	10	4,840	U	47,600	U	17,300	U	15,300	U	2	U	2,610	U	1,110	U	1,110	U
Thallium	~	1,110	U	1,110	U	1,110	U	1,110	U	2	U	2,500	U	1,110	U	1,110	U
Metals, Target Analyte, ICPM5 Dissolved		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	
Antimony	3	1,110	U	1,110	U	1,110	U	1,110	U	1	U	1,110	U	1,110	U	1,110	U
Arsenic	25	1,110	U	2,110	U	1,110	U	1,110	U	2,300	U	1,110	U	1,110	U	1,110	U
Beryllium	3	0.333	U	0.769	U	0.333	U	0.333	U	0.600	U	0.333	U	0.333	U	0.333	U
Cadmium	5	0.556	U	0.591	U	0.556	U	0.556	U	1	U	0.839	U	0.556	U	0.556	U
Selenium	10	6,470	U	29	U	16,100	U	17,600	U	2	U	1,110	U	1,110	U	1,110	U
Thallium	~	1,110	U	1,110	U	1,110	U	1,110	U	2	U	1,110	U	1,110	U	1,110	U
Mercury by 7470/7471		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	
Mercury	0.7	0.200	U	0.400	U	0.200	U	0.200	U	0.200	U	2	U	0.200	U	0.400	U
Mercury, Dissolved		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	
Mercury	0.7	0.200	U	0.200	U	0.200	U	0.200	U	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
N= 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 York ID Sampling Location Client Matrix	NYSDEC TOGS Standards and Guidance Values - GA	GW-1 2380854-01 Clay St. Water		GW-2 2380854-03 Clay St. Water		GW-3 2380854-02 Clay St. Water		GW-X 2380854-04 Clay St. Water		GW-5 2380727-08 Commercial St. Water		GW-4 2380727-09 Commercial St. Water		S-FB-1 2380854-05 Water		GW-FB-1 2380854-06 Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
PEST, 8081 MASTER																	
Dilution Factor	ug/L	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	0.00421	U	0.00571	U	0.00457	U
4,4'-DDE	0.2	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
4,4'-DDT	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Aldrin	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
alpha-BHC	0.01	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
alpha-Chlordane	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Beta-BHC	0.04	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Chlordane, total	0.05	0.211	U	0.242	U	0.222	U	0.216	U	0.211	U	0.286	U	0.229	U	0.229	U
delta-BHC	0.04	0.00421	U	0.00779	U	NT		NT		0.00421	U	NT		0.00571	U	0.00457	U
delta-BHC [ZC]	~	NT		NT		0.00568	U	0.00432	U	NT		0.00421	U	NT		NT	
Dieldrin	0.004	0.00211	U	NT		0.00222	U	0.00216	U	0.00211	U	0.00211	U	0.00286	U	0.00229	U
Endosulfan I	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Endosulfan II	~	NT		NT		0.00444	U	0.00432	U	0.00421	U	NT		NT		NT	
Endosulfan sulfate	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Endrin	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Endrin aldehyde	5	0.0105	U	0.0121	U	0.0111	U	0.0108	U	0.0105	U	0.0105	U	0.0143	U	0.0114	U
Endrin ketone	5	0.0105	U	0.0121	U	0.0111	U	0.0108	U	0.0105	U	0.0105	U	0.0143	U	0.0114	U
gamma-BHC (Lindane)	0.05	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
gamma-Chlordane	~	0.0105	U	0.0121	U	0.0111	U	0.0108	U	0.0105	U	0.0105	U	0.0143	U	0.0114	U
Heptachlor	0.04	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Heptachlor epoxide	0.03	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Methoxychlor	35	0.00421	U	0.00485	U	0.00444	U	0.00432	U	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Toxaphene	0.06	0.105	U	0.121	U	0.111	U	0.108	U	0.105	U	0.105	U	0.143	U	0.114	U
PCB, 8082 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	
Aroclor 1016	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1221	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1232	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1242	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1248	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1254	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1260	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1262	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1268	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Total PCB	0.09	0.0526	U	0.0606	U	0.0556	U	0.0541	U	0.0526	U	0.0526	U	0.0714	U	0.0571	U
PFAS, NYSDEC Target List				ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Dilution Factor		5		5		5		5		5		5		5		5	
1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)	~	0.00500	U	0.00481	U	0.0120	U	NT		NT		0.00463	U	NT		NT	
1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)	~	0.0125	U	0.0248	D	0.0200	U	NT		NT		0.00231	U	NT		NT	
N-FluorOSA	~	0.00100	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
N-MeFOSA	~	0.00100	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluoro-1-decane sulfonic acid (PFDS)	~	0.00100	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluoro-1-heptane sulfonic acid (PFHpS)	~	0.00105	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluoro-3-octanesulfonamide (PFOSA)	~	0.00100	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluorobutane sulfonic acid (PFBS)	~	0.00414	U	0.00415	U	0.0197	U	NT		NT		0.00664	U	NT		NT	
Perfluorodecanoic acid (PFDA)	~	0.00100	U	0.00096	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluorododecanoic acid (PFDoA)	~	0.00100	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluoroheptanoic acid (PFHpA)	~	0.0113	U	0.0303	U	0.0303	U	NT		NT		0.0225	U	NT		NT	
Perfluorohexane sulfonic acid (PFHS)	~	0.00381	U	0.0168	U	0.0195	U	NT		NT		0.00171	U	NT		NT	
Perfluorohexanoic acid (PFHxA)	~	0.0103	U	0.0588	U	0.0317	U	NT		NT		0.00993	U	NT		NT	
Perfluoro-n-butanoic acid (PFBA)	~	0.00690	U	0.00439	U	0.0243	U	NT		NT		0.0107	U	NT		NT	
Perfluorononanoic acid (PFNA)	~	0.00170	U	0.00100	U	0.00096	U	NT		NT		0.0172	U	NT		NT	
Perfluorooctane sulfonic acid (PFOS)	~	0.0187	U	0.0152	U	0.0703	U	NT		NT		0.0318	U	NT		NT	
Perfluorooctanoic acid (PFOA)	~	0.0884	U	0.0900	U	0.111	U	NT		NT		0.0747	U	NT		NT	
Perfluoropentanoic acid (PFPeA)	~	0.00916	U	0.00505	U	0.0316	U	NT		NT		0.00562	U	NT		NT	
Perfluorotetradecanoic acid (PFTA)	~	0.00100	U	0.00096	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluorotridecanoic acid (PFTDA)	~	0.00100	U	0.00100	U	0.00096	U	NT		NT		0.00093	U	NT		NT	
Perfluoroundecanoic acid (PFUnA)	~	0.00100	U	0.00096	U	0.00096	U	NT		NT		0.00093	U	NT		NT	

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 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
Soil Vapor Samples
Clay Street, Brooklyn

Sample ID	Sample Location	Sampling Date	Client Matrix	NYSDOH Immediate Action Levels	NYSDOH Air Guidance Values	OA-1 Clay Street 2/14/2023 12:43:00 PM Outdoor Ambient Air		SV-1 Clay Street 2/14/2023 12:07:00 PM Soil Vapor		SV-2 Clay Street 2/14/2023 12:05:00 PM Soil Vapor		SV-3 Clay Street 2/14/2023 12:10:00 PM Soil Vapor		SV-4 Clay Street 2/14/2023 11:14:00 AM Soil Vapor		SV-5 Clay Street 2/14/2023 11:25:00 AM Soil Vapor		SV-6 Clay Street 2/14/2023 11:20:00 AM Soil Vapor		OA-2 Commercial Street 2/14/2023 1:10:00 PM Outdoor Ambient Air		SV-7 Commercial Street 2/14/2023 1:01:00 PM Soil Vapor		SV-8 Commercial Street 2/14/2023 12:09:00 PM Soil Vapor		SV-9 Commercial Street 2/14/2023 12:00:00 PM Soil Vapor				
						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
Volatile Organics, EPA TO15 Full List																														
Dilution Factor						0.814		562.8		5.404		10746.7		328.2		130.32		1.447		0.722		7.06		31.08		6.064		4.200		U
1,1,1,2-Tetrachloroethane						0.560	U	3.700	U	20	U	9.700	U	11	U	11	U	0.990	U	0.500	U	4.800	U	11	U	6.064	U	4.200	U	U
1,1,1-Trichloroethane	100					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	3.300	U	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	4.200	U	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)						0.620	U	11	U	4.300	U	22	U	13	U	11	U	1.100	U	0.550	U	5.400	U	12	U	4.600	U	4.600	U	U
1,1,2-Trichloroethane						0.440	U	7.700	U	2.900	U	16	U	9	U	8.900	U	0.790	U	0.290	U	3.900	U	8.500	U	3.300	U	3.300	U	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	2.500	U	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	0.600	U	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	4.500	U	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	3	U	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	4.700	U	U
1,2-Dichlorobenzene						0.490	U	8.500	U	3.200	U	18	U	9.900	U	9.900	U	0.870	U	0.330	U	4.200	U	9.300	U	3.600	U	3.600	U	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	2.500	U	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	2.800	U	U
1,2-Dichlorotetrafluoroethane						0.570	U	9.800	U	3.800	U	20	U	11	U	11	U	1	U	0.500	U	4.900	U	11	U	4.200	U	4.200	U	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	3	U	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	U	7.800	U	D
1,3-Dichlorobenzene						0.490	U	8.500	U	3.200	U	18	U	9.900	U	9.900	U	0.870	U	0.430	U	4.200	U	9.300	U	3.600	U	3.600	U	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	2.800	U	U
1,4-Dichlorobenzene						0.490	U	8.500	U	3.200	U	18	U	9.900	U	9.900	U	0.870	U	0.430	U	4.200	U	9.300	U	3.600	U	3.600	U	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	4.400	U	U
2-Butanone						0.820	D	4.100	D	1.900	D	8.600	D	4.800	U	4.800	U	0.430	U	0.870	D	11	D	4.600	U	1.800	U	1.800	U	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	5	U	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	9.500	U	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	2.500	U	U
Acetone						3.700	D	42	D	36	D	42	D	42	D	42	D	8	D	46	D	26	D	26	D	26	D	26	D	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	1.300	U	1.300	U	D
Benzene						0.310	D	4.500	D	1.700	D	9.300	D	5.200	D	5.200	D	0.460	D	0.280	D	2.500	D	5	D	1.900	U	1.900	U	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	3.100	U	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	4.100	U	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	6.300	U	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	2.400	U	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	U	4.900	U	13	D	13	D	U
Carbon tetrachloride						0.260	D	2.200	D	0.850	D	9.300	D	2.600	D	2.600	D	0.360	D	0.360	D	1.100	D	27	D	1.500	D	1.500	D	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	2.800	U	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	1.600	U	U
Chloroform						0.400	U	38	D	5	D	300	D	62	D	15	D	0.710	D	0.350	D	3.400	D	52	D	3.300	D	3.300	D	D
Chloromethane						1.300	D	2.900	D	1.100	D	6	D	3.400	D	3.400	D	0.300	U	1.100	D	1.500	D	3.200	U	1.300	U	1.300	U	U
cis-1,2-Dichloroethylene						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	D	2.500	D	0.600	U	0.600	U	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	2.800	U	U
Cyclohexane						0.280	D	17	D	1.900	D	10	D	5.600	D	5.600	D	0.500	D	0.250	D	8	D	8	D	23	D	23	D	D
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	5.200	U	U
Dichlorodifluoromethane						2.400	D	7	D	2.700	D	14	D	8.100	D	8.100	D	2.900	D	2.500	D	3.500	D	7.700	D	3	D	3	D	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	4.400	U	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	D	10	D	6.700	U	6.100	D	6.		

Table 15
 Volatile Organic Compounds in Soil Samples
 19-27 Clay Street, Brooklyn NY

Sample ID York ID Sampling Date Client Matrix	Compound	NYSDC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDC Part 375 Restricted Use Soil Cleanup Objectives- Residential	SB-11 (1-3 R)		SB-11 (6-8 R)		SB-12 (0-2 R)		SB-12 (5-7 R)		SB-13 (4-6 R)		SB-14 (0-2 R)		SB-14 (5-7 R)		
				23E0798-01 5/12/2023 9:42:00 AM	23E0798-02 5/12/2023 9:45:00 AM	23E0798-03 5/12/2023 10:14:00 AM	23E0798-04 5/12/2023 10:47:00 AM	23E0798-05 5/12/2023 10:52:00 AM	23E0798-06 5/12/2023 10:55:00 AM	23E0798-07 5/12/2023 11:24:00 AM	23E0798-08 5/12/2023 11:28:00 AM							
		Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	Result mg/Kg	Q	
VOA, S26 MASTER		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		
1,1,1,2-Tetrachloroethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,1,1-Trichloroethane		0.68	100	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,1,2,2-Tetrachloroethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	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	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,1,2-Trichloroethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,1-Dichloroethane		0.27	19	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,1-Dichloroethylene		0.33	100	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,1-Dichloropropylene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2,3-Trichlorobenzene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2,3-Trichloropropane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2,4,5-Tetraethylbenzene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2,4-Trichlorobenzene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2,4-Trimethylbenzene		3.6	47	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2-Dibromo-3-chloropropane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2-Dibromoethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2-Dichlorobenzene		1.1	100	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2-Dichloroethane		0.02	2.3	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,2-Dichloropropane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,3,5-Trimethylbenzene		8.4	47	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,3-Dichlorobenzene		2.4	~	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,3-Dichloropropane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,4-Dioxobenzene		1.8	19	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
1,4-Dioxane		0.1	9.8	~	0.0700	U	0.0420	U	0.0420	U	0.0560	U	0.0430	U	0.0710	U	0.0420	U
2,2-Dichloropropane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
2-Butanone		0.12	100	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
2-Chlorobutylvinyl ether		~	0.140	U	0.00930	U	0.0100	U	0.00840	U	0.0110	U	0.00860	U	0.0140	U	0.00850	U
2-Chlorotoluene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
2-Hexanone		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
4-Chlorotoluene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
4-Methyl-2-pentanone		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Acetone		0.05	100	~	0.00700	U	0.00470	J	0.00970	J	0.00560	J	0.00560	J	0.0110	J	0.00660	J
Acrolein		~	0.00700	U	0.00470	U	0.00520	U	0.00420	U	0.00560	U	0.00430	U	0.00710	U	0.00420	U
Acrylonitrile		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Benzene		0.06	2.9	~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00360	U	0.00210	U
Bromobenzene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Bromochloromethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Bromodichloromethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Bromofrom		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Bromomethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Carbon disulfide		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Carbon tetrachloride		0.76	1.4	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Chlorobenzene		1.1	100	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Chloroethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Chloroform		0.37	10	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.0110	U	0.00210	U
Chloromethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
cis-1,2-Dichloroethylene		0.25	59	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
cis-1,3-Dichloropropylene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Cyclohexane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Dibromochloromethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Dibromomethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Dichlorodifluoromethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Diisopropyl ether (DIPE)		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Ethanol		~	0.0560	U	0.0370	U	0.0420	U	0.0480	U	0.0450	U	0.0340	U	0.0570	U	0.0340	U
Ethyl Benzene		1	30	~	0.00350	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Ethyl tert-butyl ether (ETBE)		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Hexachlorobenzene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Isomethane		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Isopropylbenzene		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Methyl acetate		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210	U	0.00360	U	0.00210	U
Methyl Methacrylate		~	0.00350	U	0.00230	U	0.00260	U	0.00210	U	0.00280	U	0.00210					

Table 16
19 Clay Street, Brooklyn NY
Volatile Organic Compounds In Groundwater

Sample ID York ID Sampling Date Client Matrix	NYSDEC TOGS Standards and Guidance Values - GA	GW-6 23E0792-01 5/12/2023 9:48:00 AM		GW-7 23E0792-02 5/12/2023 10:20:00 AM		GW-8 23E0792-03 5/12/2023 10:57:00 AM	
		Water		Water		Water	
		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
Volatiles Organics, EPA TO15 Full List	ug/m3		ug/m3	
Dilution Factor	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:

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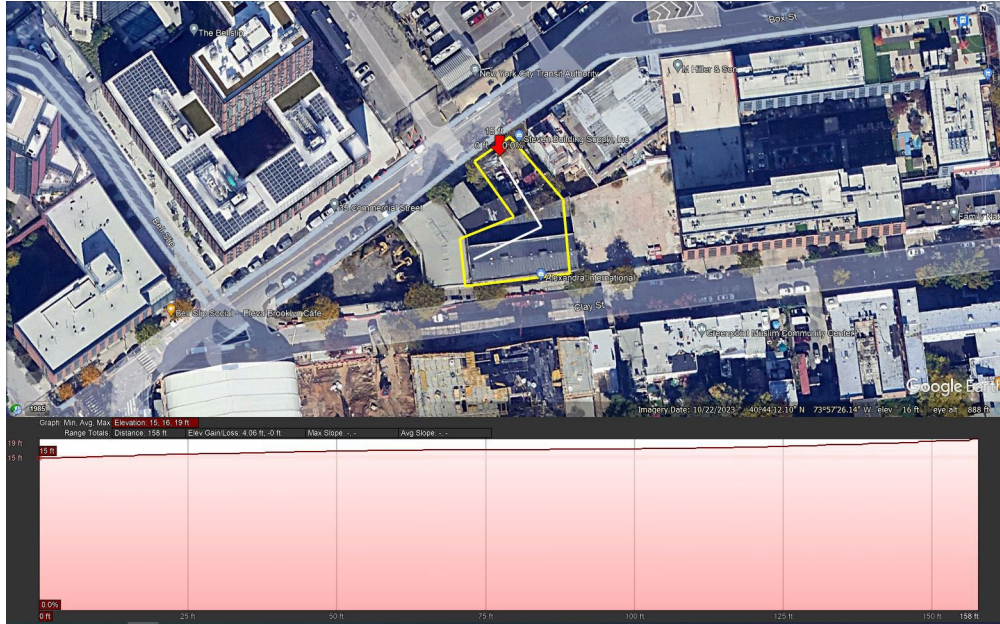


APPENDIX E – GREEN AND SUSTAINABLE REMEDIATION DOCUMENTATION

Climate Screening Checklist

Background

- Project Manager: **Victoria Whelan**
- Site Name: **19 Clay Street**
- Site Number: **C224390**
- Site Location: **19-27 Clay Street Brooklyn, NY**
- Site Elevation (average above sea level): **Approximately 16 feet above sea level (from google earth).**



- ClimAID region: **Region 4—New York City and Long Island**



- Remedial Stage/Site Classification: **Site Investigation- Class 2**
- Contamination -- Media Impacted/Contaminants of Concern:

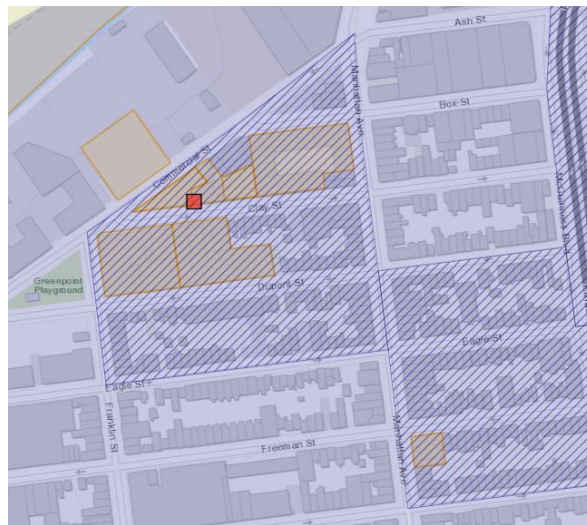
- Soil, Vapor Intrusion/Indoor Air, Groundwater- COCs: TCE, PCE, Trichloroethane, cis-1,2-dichloroethylene, 1,1,1-Trichloroethane, Carbon Tetrachloride, Phenol, Dibenzo (a,h)anthracene, Arsenic, Copper, Lead, Mercury,
- Proposed/Current Remedy: Proposed additional investigation to design remedial action and interim remedial measures (IRMs). Proposed IRMs include installation of an active SSDS system and a combination of biological enhanced reductive dechlorination and abiotic in-situ chemical reduction injections.
- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?
 - The remedial investigation is anticipated to take 15 working days to complete. IRMs will take approximately 15 working days for the injections and 30 working days for installation and startup of the SSDS. The SSDS is anticipated to be in place for ~20 years.

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfoLocator: [DECinfo Locator \(ny.gov\)](https://decinfolocator.ny.gov/))?

Yes No

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

Yes No



Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

Yes No

Climate Screening Table*

Potential Climate Hazards	Relevant to the Site Location (Y/N/NA) ¹	Projected Change (Put the reference document/model used here) ³	Potential to Impact Remedy (Y/N)	Is remedy/site already resilient? (Y/N) ⁴
Precipitation	Potentially	Based upon FEMA's Resiliency Analysis Planning Tool the annual rain fall is projected to increase between 7.62 and 11.20 inches by the end of the century	N/A	N/A
Temperature (Extreme Heat or Cold Weather Impacts) ²	Y	Based upon FEMA's Resiliency Analysis Planning Tool, by the end of the century there will be an estimated increase of 525.15 cooling degree days.	N	Y – RI and IRMs are not susceptible to extreme temperatures.
Sea Level Rise	N	N - Based upon the NOAA's Sea Level Rise Viewer the site is not impacted at 10 feet of SLR.	N/A	N/A

Flooding ⁵	Y	Based upon FEMA's Resiliency Analysis Planning Tool, a portion of the site falls within the 0.2% annual chance flood hazard area.	Y	Y – SSDS blower will be skid mounted and not mounted directly to the ground level.
Storm Surge	Y	Y – NOAA's Storm Surge Risk Maps tool indicates that the site could be impacted by less than 3 ft of water during category 1 hurricanes and over 9 ft of water for category 3 and higher hurricanes	Y	N
Wildfire	N	N/A	N/A	N/A
Drought	N	N/A	N/A	N/A
Storm Severity (could include high winds, lightning, etc.)	Y	N - Based upon FEMA's Resiliency Analysis Planning Tool, there is no increase in storm severity outlook.	N	Y – RI and injections will not be impacted by sever weather. The SSDS system will be evaluated for the addition of a telemetry system to indicate the operation status remotely.
Landslides	N	N/A	N/A	N/A
Other Hazards:	Seismic Activity – N/A	N/A	N/A	N/A

*Links to potential data sources can be found on the following page

¹ If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

² Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 30 degrees F (NYSERDA ClimAID report), Note: this is important for sites with active remedial systems/sites where the remedy relies on the electrical grid

³ List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

⁴ If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

⁵ For system sites- components (e.g. electrical wiring and panels) should be evaluated to determine if they would need to be raised to avoid flooding.

Required Next Steps (If no further action, provide justification):

The vulnerability that was assessed was the low-lying position of the SSDS blower that has the potential to be impacted by flooding or storm surges and the lack of a telemetry system for indicating the system operation during severe weather. The system design will be evaluated for the potential to place the blower at a higher elevation and addition of a telemetry system capable of remotely indicating the system function.

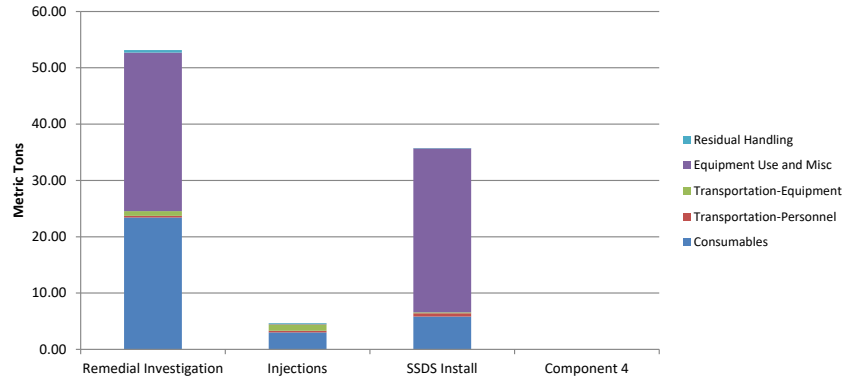
SiteWise Project Summary
Overall

Sustainable Remediation - Environmental Footprint Summary
Clay Street GSR

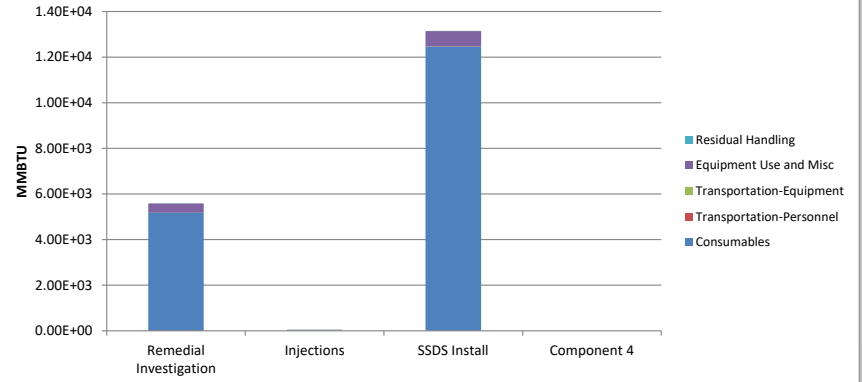
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton	
Remedial Investigation	Consumables	23.41	5.2E+03	NA	NA	NA	NA	NA	3.2E-02	4.3E-02	5.4E-03	NA	NA
	Transportation-Personnel	0.29	3.6E+00	NA	NA	NA	NA	NA	1.1E-04	3.7E-06	2.1E-05	1.2E-05	9.4E-04
	Transportation-Equipment	0.86	1.1E+01	NA	NA	NA	NA	NA	2.7E-04	4.8E-06	2.4E-05	4.3E-06	3.5E-04
	Equipment Use and Misc	28.14	4.0E+02	0.0E+00	0.0E+00	1.3E-03	1.4E-04	1.2E-04	1.4E-01	1.0E-01	1.1E-02	2.1E-06	1.2E-03
	Residual Handling	0.44	5.8E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.4E-04	2.5E-06	1.2E-05	1.1E-06	8.8E-05
	Sub-Total	53.14	5.59E+03	0.00E+00	0.00E+00	1.34E-03	1.44E-04	1.17E-04	1.68E-01	1.44E-01	1.68E-02	1.91E-05	2.55E-03
Injections	Consumables	3.01	2.1E+01	NA	NA	NA	NA	NA	6.0E-03	1.2E-02	2.4E-03	NA	NA
	Transportation-Personnel	0.29	3.6E+00	NA	NA	NA	NA	NA	1.1E-04	3.7E-06	2.1E-05	1.2E-05	9.4E-04
	Transportation-Equipment	1.15	1.5E+01	NA	NA	NA	NA	NA	3.6E-04	6.4E-06	3.2E-05	6.2E-06	5.0E-04
	Equipment Use and Misc	0.10	1.0E+00	1.1E+04	0.0E+00	8.0E-05	0.0E+00	4.4E-04	1.7E-04	5.3E-05	5.3E-04	0.0E+00	0.0E+00
	Residual Handling	0.15	1.9E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	4.6E-05	8.1E-07	4.1E-06	7.8E-07	6.3E-05
	Sub-Total	4.68	4.21E+01	1.15E+04	0.00E+00	8.00E-05	0.00E+00	4.40E-04	6.70E-03	1.21E-02	2.99E-03	1.87E-05	1.51E-03
SSDS Install	Consumables	5.84	1.2E+04	NA	NA	NA	NA	NA	2.0E-02	1.4E-02	4.5E-03	NA	NA
	Transportation-Personnel	0.57	7.2E+00	NA	NA	NA	NA	NA	2.1E-04	7.5E-06	4.3E-05	2.3E-05	1.9E-03
	Transportation-Equipment	0.15	2.0E+00	NA	NA	NA	NA	NA	4.8E-05	8.4E-07	4.2E-06	3.9E-07	3.1E-05
	Equipment Use and Misc	29.14	6.7E+02	4.7E+04	9.1E+01	0.0E+00	0.0E+00	0.0E+00	2.8E-02	3.8E-02	2.1E-02	0.0E+00	0.0E+00
	Residual Handling	0.05	6.0E-01	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.4E-05	2.5E-07	1.3E-06	2.2E-07	1.8E-05
	Sub-Total	35.75	1.31E+04	4.67E+04	9.15E+01	0.00E+00	0.00E+00	0.00E+00	4.79E-02	5.12E-02	2.56E-02	2.40E-05	1.93E-03
Component 4	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		9.4E+01	1.9E+04	5.8E+04	9.1E+01	1.4E-03	1.4E-04	5.6E-04	2.2E-01	2.1E-01	4.5E-02	6.2E-05	6.0E-03

Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	\$		%	
Remedial Investigation	0.0E+00	0.0E+00	0.0E+00	0	2.0E-02	0.0%	\$0
Injections	0.0E+00	0.0E+00	0.0E+00	0	1.2E-02	0.0%	
SSDS Install	0.0E+00	0.0E+00	0.0E+00	0	1.5E-02	24.2%	
Component 4	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Total	0.0E+00	0.0E+00	0.0E+00	\$0	4.8E-02	6.1%	

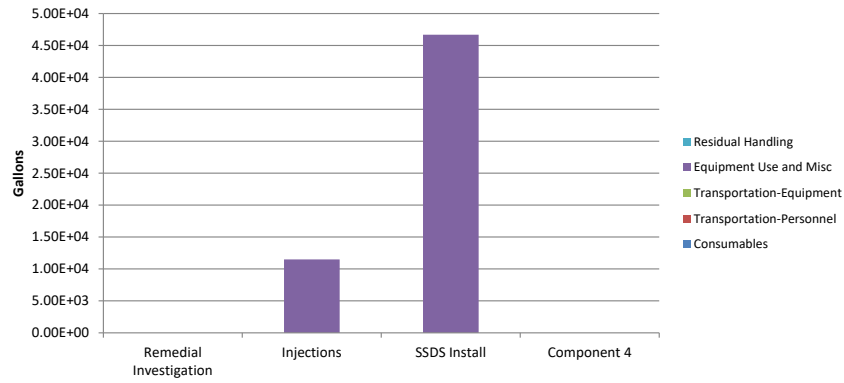
GHG Emissions



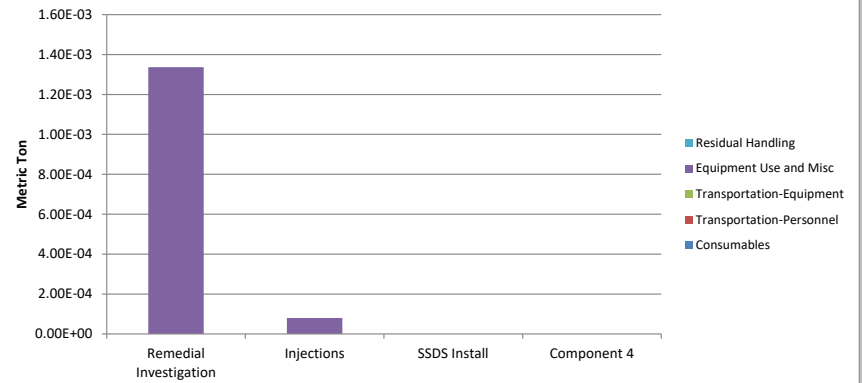
Total Energy Used



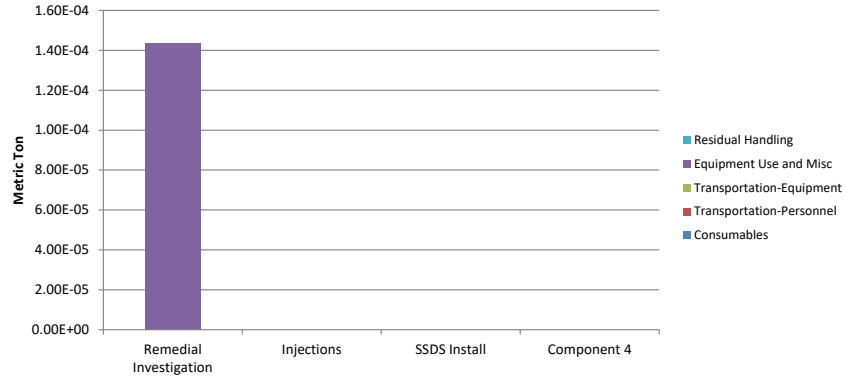
Water Consumption



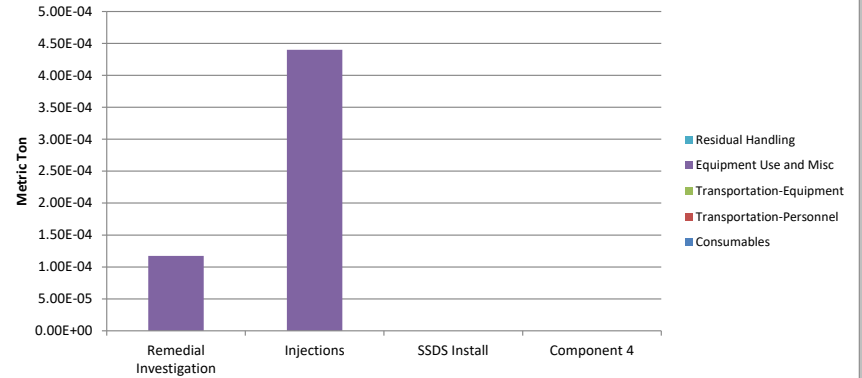
Onsite NOx Emissions



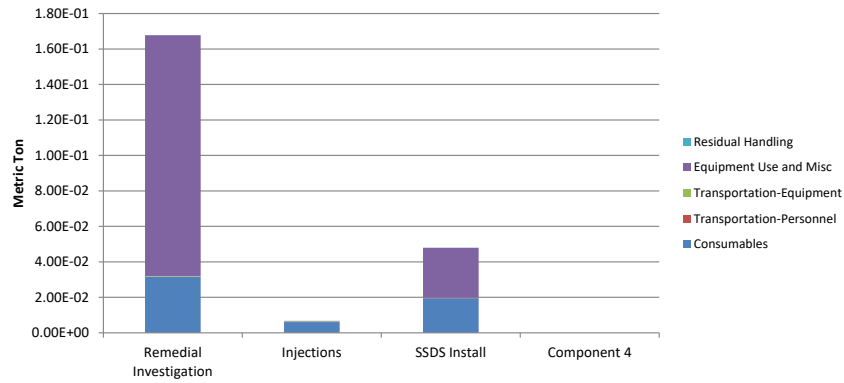
Onsite SOx Emissions



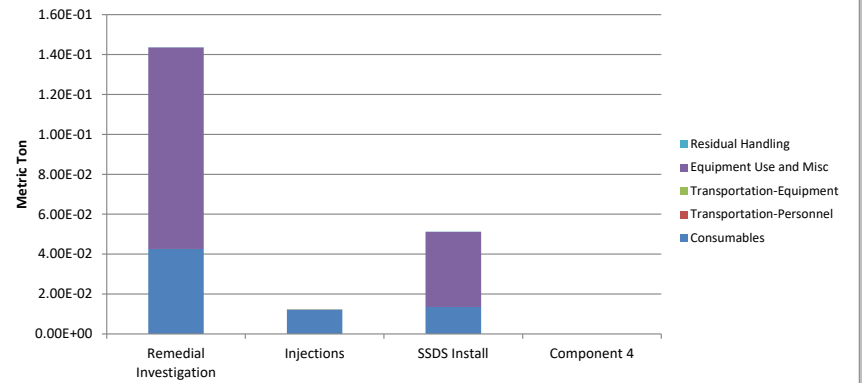
Onsite PM₁₀ Emissions



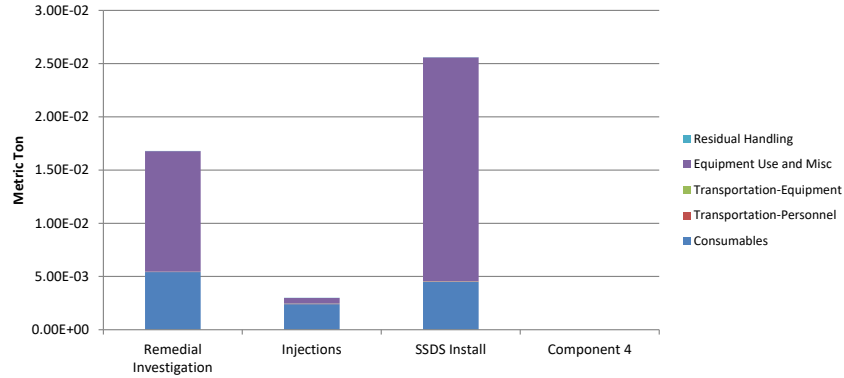
Total NOx Emissions



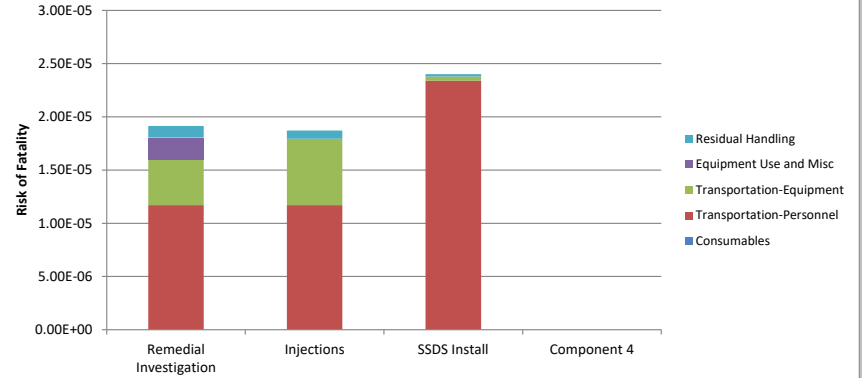
Total SOx Emissions



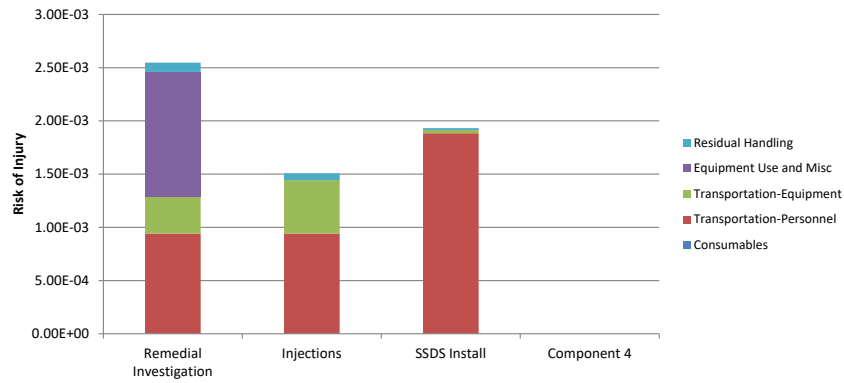
Total PM₁₀ Emissions



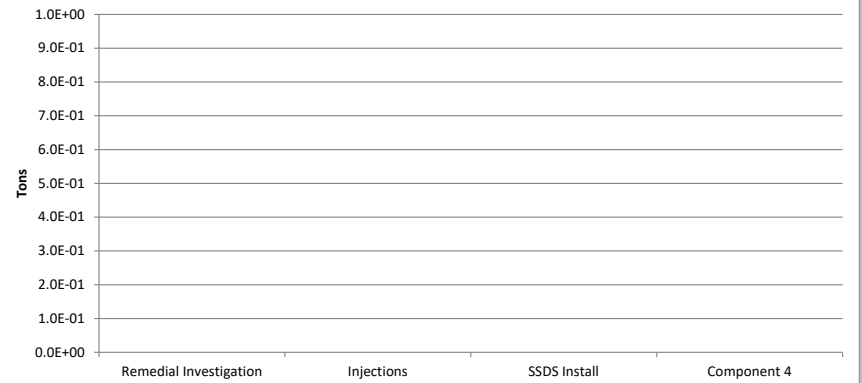
Accident Risk - Fatality



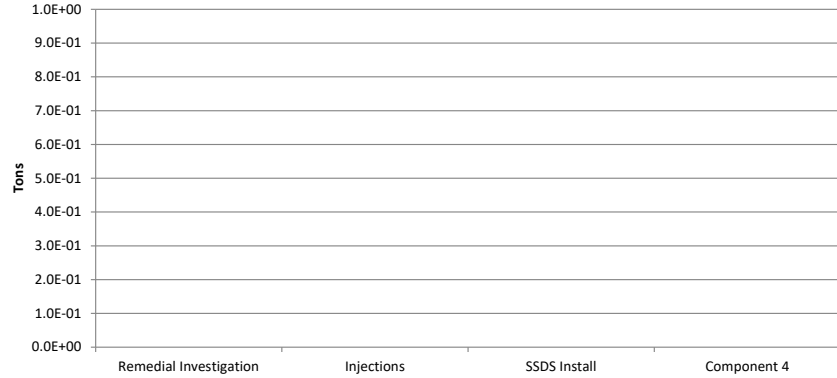
Accident Risk - Injury



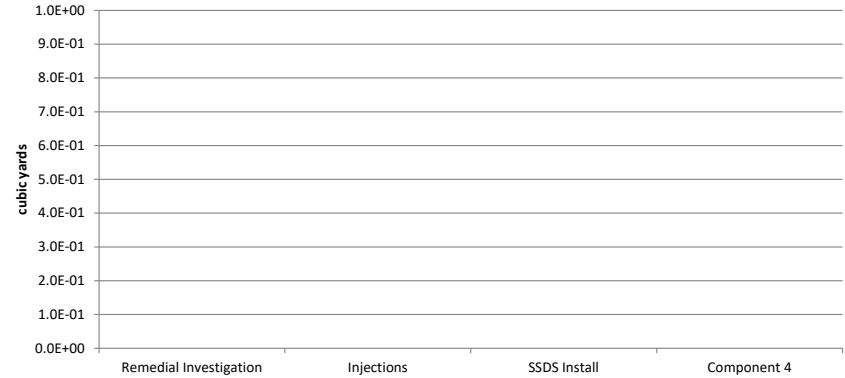
Non-Hazardous Waste Landfill Space



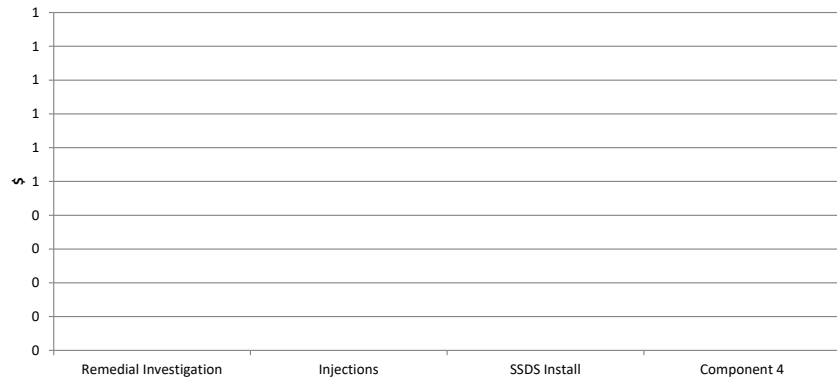
Hazardous Waste Landfill Space



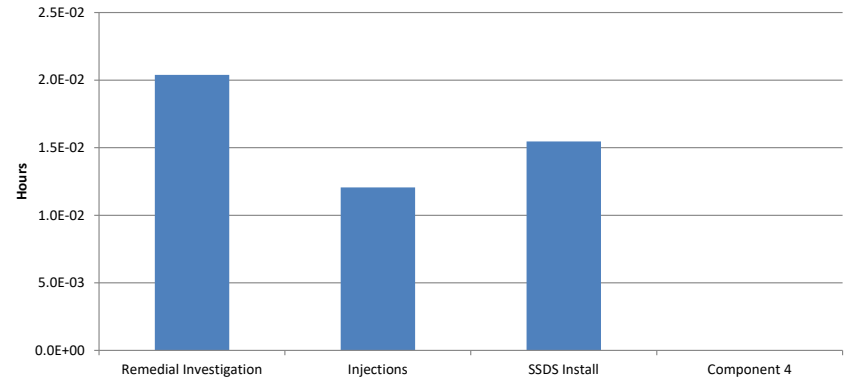
Topsoil Consumption



Costing



Lost Hours - Injury



SiteWise Project Summary
Remedial Investigation

Sustainable Remediation Summary - Remedial Investigation

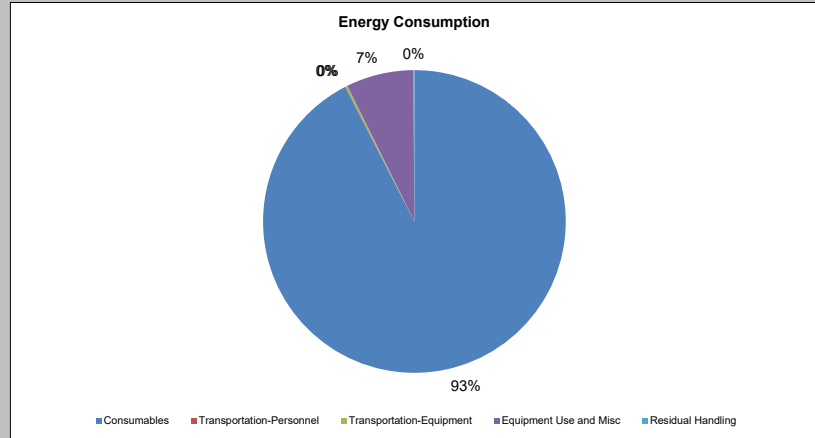
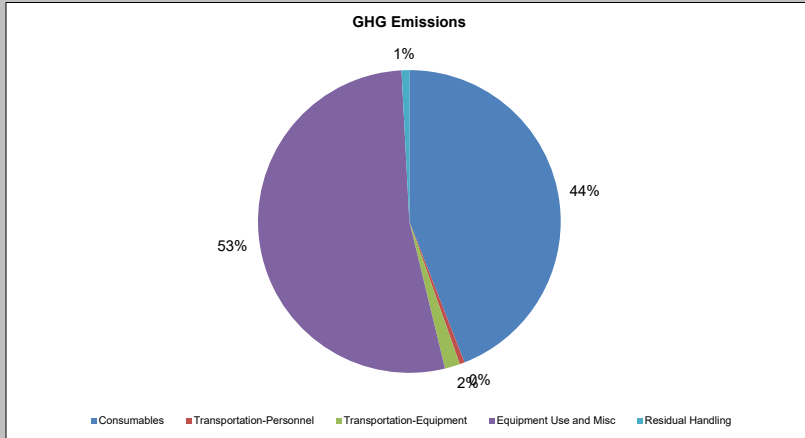
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	23.41	44.1	5.2E+03	92.4	NA	NA	NA	NA	NA	-	NA	-	NA	-	3.2E-02	18.8	4.3E-02	29.7	5.4E-03	32.2	NA	NA	NA	NA
Transportation-Personnel	0.29	0.5	3.6E+00	0.1	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.1E-04	0.1	3.7E-06	0.0	2.1E-05	0.1	1.2E-05	61.1	9.4E-04	37.0
Transportation-Equipment	0.86	1.6	1.1E+01	0.2	NA	NA	NA	NA	NA	-	NA	-	NA	-	2.7E-04	0.2	4.8E-06	0.0	2.4E-05	0.1	4.3E-06	22.4	3.5E-04	13.6
Equipment Use and Misc	28.14	53.0	4.0E+02	7.2	0.0E+00	0.0	0.0E+00	0.0	1.3E-03	100.0	1.4E-04	100.0	1.2E-04	100.0	1.4E-01	80.9	1.0E-01	70.3	1.1E-02	67.4	2.1E-06	10.8	1.2E-03	46.0
Residual Handling	0.44	0.8	5.8E+00	0.1	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	1.4E-04	0.1	2.5E-06	0.0	1.2E-05	0.1	1.1E-06	5.7	8.8E-05	3.4
Total	53.14	100.0	5.59E+03	100.0	0.00E+00	0.0	0.00E+00	0.0	1.34E-03	100.0	1.44E-04	100.0	1.17E-04	100.0	1.68E-01	100.0	1.44E-01	100.0	1.68E-02	100.0	1.91E-05	100.0	2.55E-03	100.0

Additional Sustainability Metrics

Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd ³)	0.0
Cost of Phase (\$)	0.0
Lost Hours - Injury	0.0

Footprint Reduction

Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	0.0%
Landfill gas reduction (metric ton CO ₂ e)	0.00E+00
GHG emissions (metric ton CO ₂ e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00



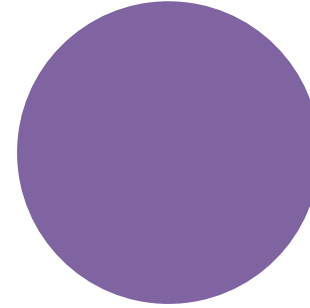
Water Consumption

0%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite NOx Emissions

0%

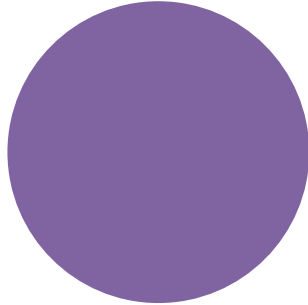


100%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite SOx Emissions

0%

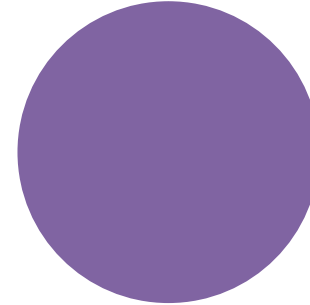


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■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite PM10 Emissions

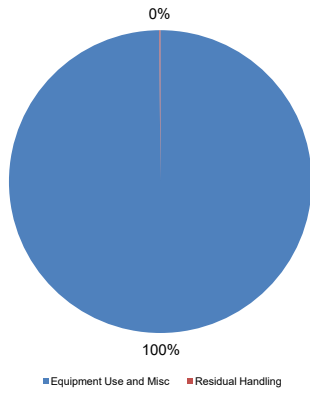
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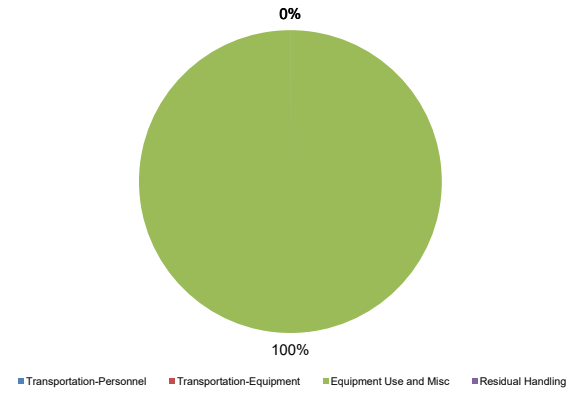
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■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

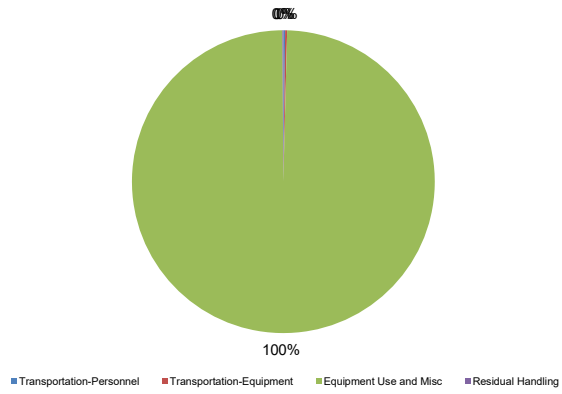
Offsite NOx Emissions



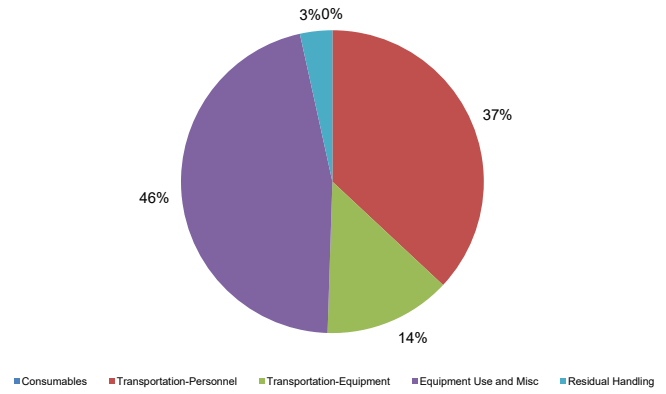
Offsite SOx Emissions



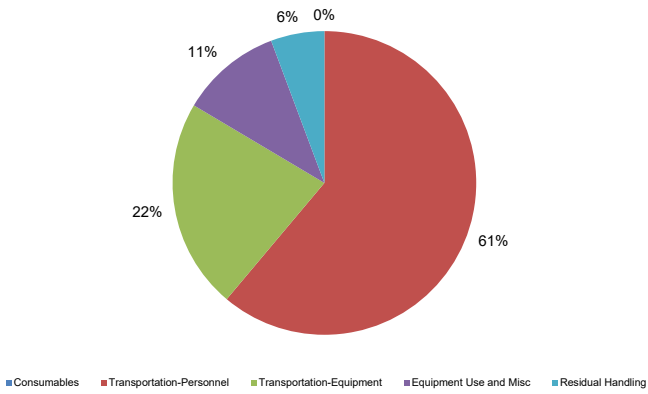
Offsite PM10 Emissions



Accident Risk - Injury



Accident Risk - Fatality



SiteWise Project Summary
Injections

Sustainable Remediation Summary - Injections

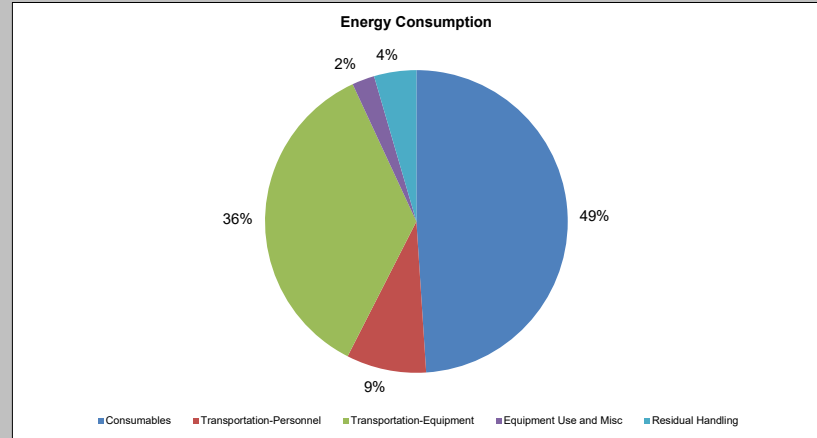
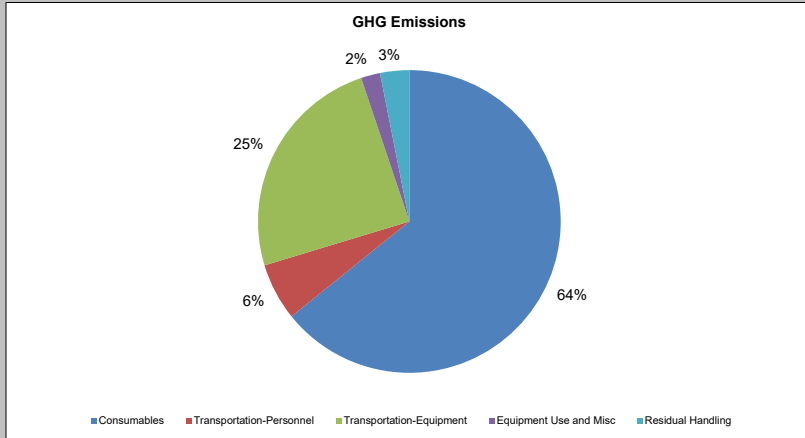
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	3.01	64.2	2.1E+01	49.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	6.0E-03	89.8	1.2E-02	99.5	2.4E-03	80.4	NA	NA	NA	NA
Transportation-Personnel	0.29	6.1	3.6E+00	8.5	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.1E-04	1.6	3.7E-06	0.0	2.1E-05	0.7	1.2E-05	62.5	9.4E-04	62.5
Transportation-Equipment	1.15	24.5	1.5E+01	35.6	NA	NA	NA	NA	NA	-	NA	-	NA	-	3.6E-04	5.4	6.4E-06	0.1	3.2E-05	1.1	6.2E-06	33.3	5.0E-04	33.3
Equipment Use and Misc	0.10	2.0	1.0E+00	2.4	1.1E+04	100.0	0.0E+00	0.0	8.0E-05	100.0	0.0E+00	-	4.4E-04	100.0	1.7E-04	2.6	5.3E-05	0.4	5.3E-04	17.7	0.0E+00	-	0.0E+00	-
Residual Handling	0.15	3.1	1.9E+00	4.5	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	4.6E-05	0.7	8.1E-07	0.0	4.1E-06	0.1	7.8E-07	4.2	6.3E-05	4.2
Total	4.68	100.0	4.21E+01	100.0	1.15E+04	100.0	0.00E+00	0.0	8.00E-05	100.0	0.00E+00	0.0	4.40E-04	100.0	6.70E-03	100.0	1.21E-02	100.0	2.99E-03	100.0	1.87E-05	100.0	1.51E-03	100.0

Additional Sustainability Metrics

Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd ³)	0.0
Cost of Phase (\$)	0.0
Lost Hours - Injury	0.0

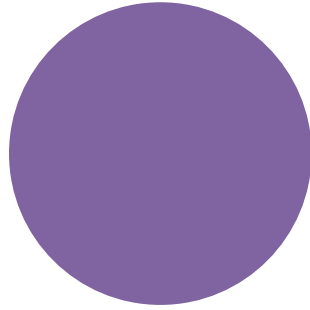
Footprint Reduction

Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	0.0%
Landfill gas reduction (metric ton CO ₂ e)	0.00E+00
GHG emissions (metric ton CO ₂ e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00



Water Consumption

0%

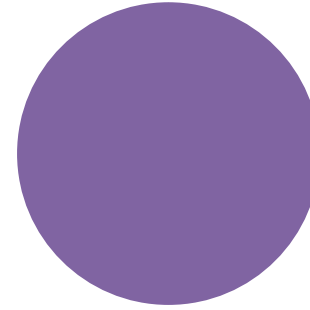


100%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite NOx Emissions

0%



100%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

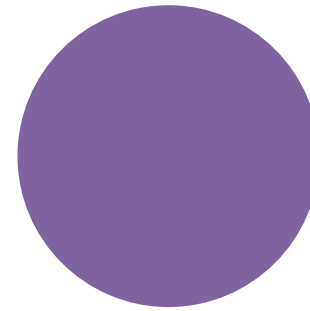
Onsite SOx Emissions

0%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite PM10 Emissions

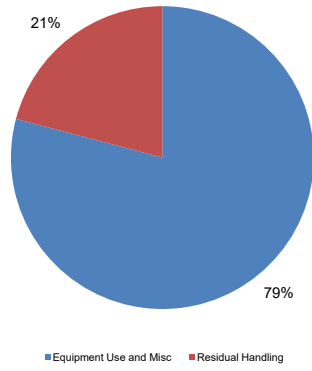
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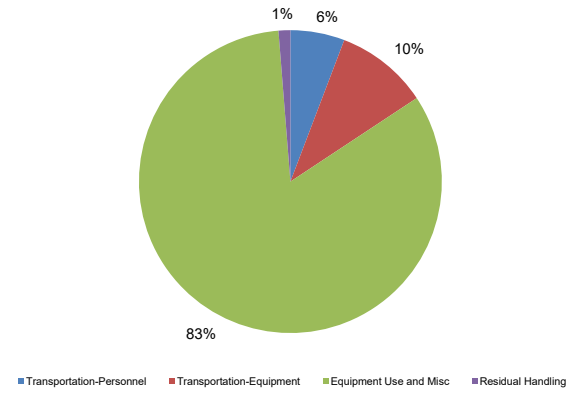
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■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

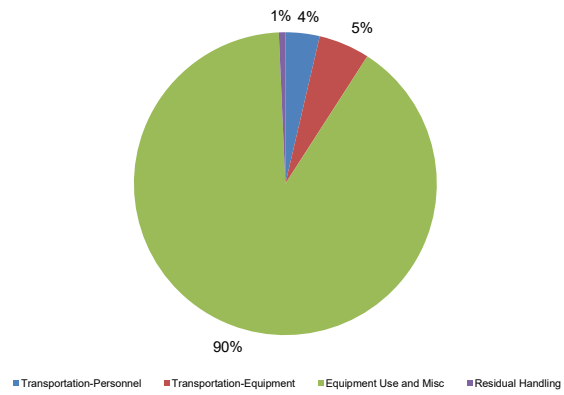
Offsite NOx Emissions



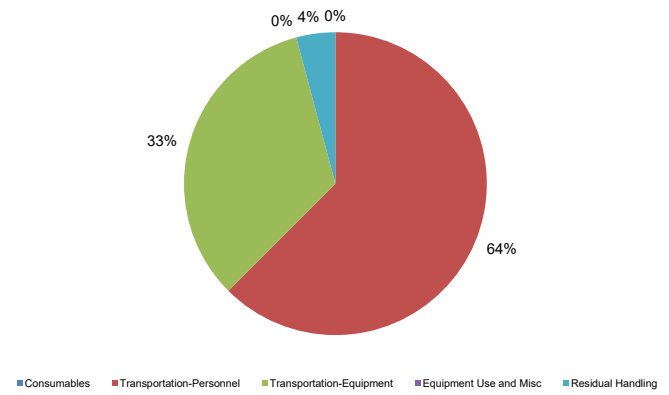
Offsite SOx Emissions



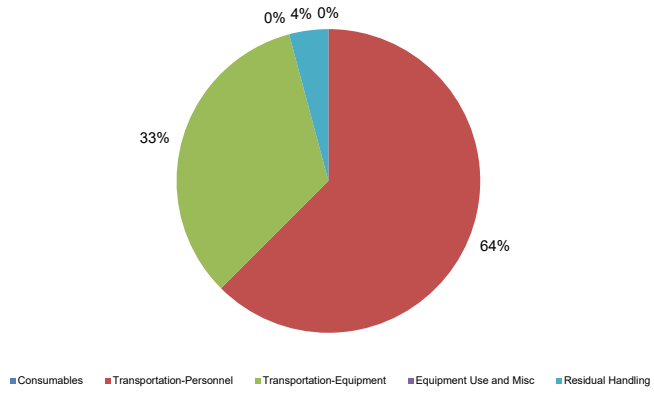
Offsite PM10 Emissions



Accident Risk - Injury



Accident Risk - Fatality



SiteWise Project Summary
SSDS Installation

Sustainable Remediation Summary - SSSD Install

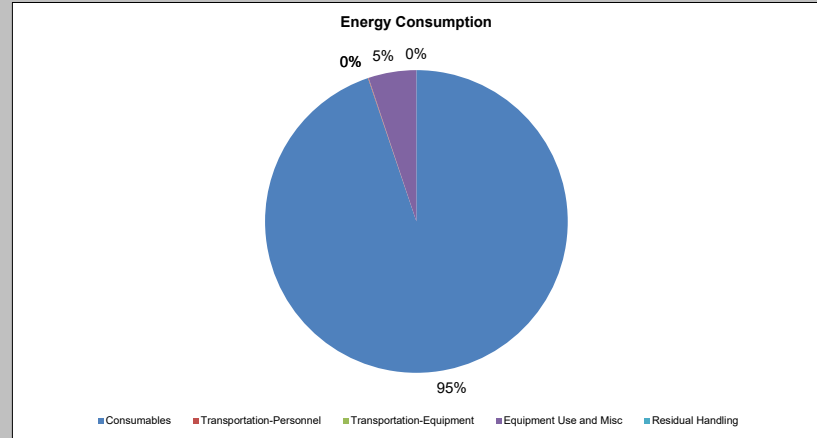
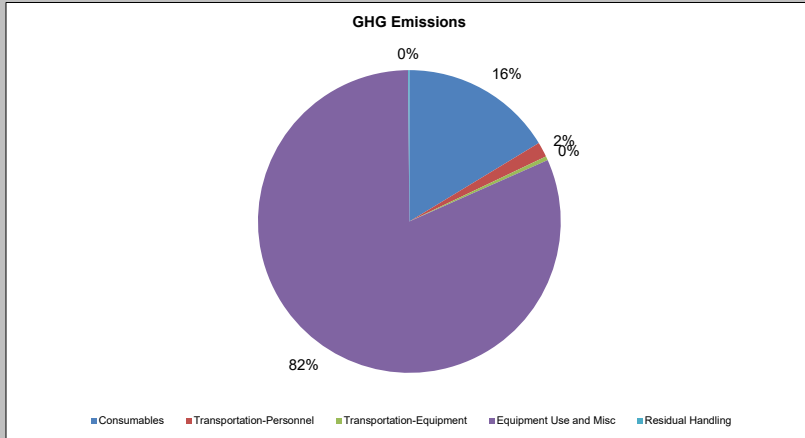
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	5.84	16.3	1.2E+04	94.8	NA	NA	NA	NA	NA	-	NA	-	NA	-	2.0E-02	40.7	1.4E-02	26.4	4.5E-03	17.6	NA	NA	NA	NA
Transportation-Personnel	0.57	1.6	7.2E+00	0.1	NA	NA	NA	NA	NA	-	NA	-	NA	-	2.1E-04	0.4	7.5E-06	0.0	4.3E-05	0.2	2.3E-05	97.5	1.9E-03	97.5
Transportation-Equipment	0.15	0.4	2.0E+00	0.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	4.8E-05	0.1	8.4E-07	0.0	4.2E-06	0.0	3.9E-07	1.6	3.1E-05	1.6
Equipment Use and Misc	29.14	81.5	6.7E+02	5.1	4.7E+04	100.0	9.1E+01	100.0	0.0E+00	-	0.0E+00	-	0.0E+00	-	2.8E-02	58.7	3.8E-02	73.6	2.1E-02	82.2	0.0E+00	-	0.0E+00	-
Residual Handling	0.05	0.1	6.0E-01	0.0	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	1.4E-05	0.0	2.5E-07	0.0	1.3E-06	0.0	2.2E-07	0.9	1.8E-05	0.9
Total	35.75	100.0	1.31E+04	100.0	4.67E+04	100.0	9.15E+01	100.0	0.00E+00	0.0	0.00E+00	0.0	0.00E+00	0.0	4.79E-02	100.0	5.12E-02	100.0	2.56E-02	100.0	2.40E-05	100.0	1.93E-03	100.0

Additional Sustainability Metrics

Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd ³)	0.0
Cost of Phase (\$)	0.0
Lost Hours - Injury	0.0

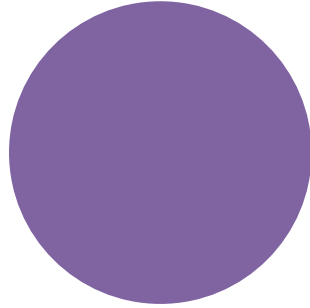
Footprint Reduction

Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	24.2%
Landfill gas reduction (metric ton CO ₂ e)	0.00E+00
GHG emissions (metric ton CO ₂ e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00



Water Consumption

0%



100%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite NOx Emissions

0%

■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite SOx Emissions

0%

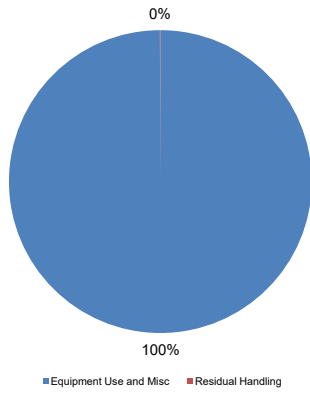
■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

Onsite PM10 Emissions

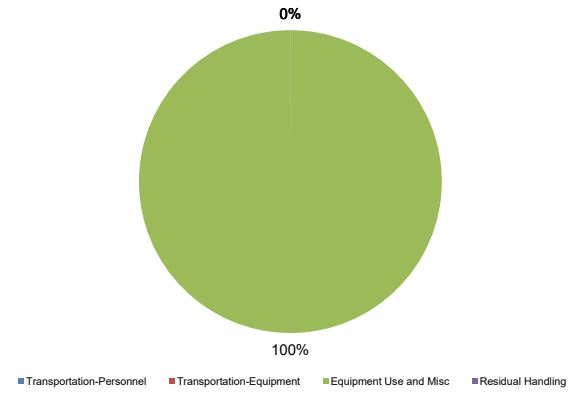
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■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling

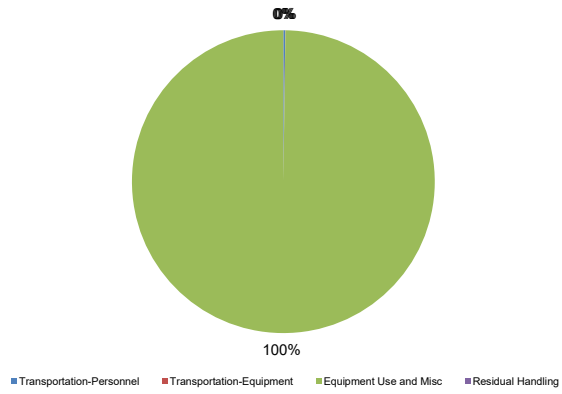
Offsite NOx Emissions



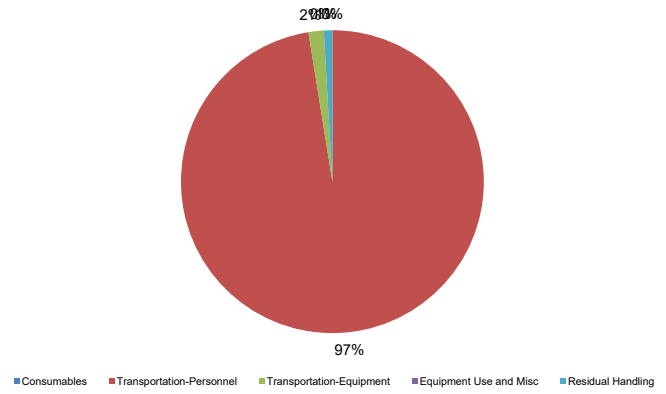
Offsite SOx Emissions



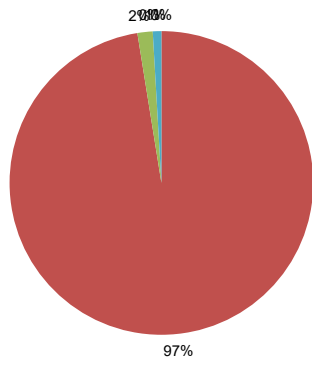
Offsite PM10 Emissions



Accident Risk - Injury



Accident Risk - Fatality



■ Consumables ■ Transportation-Personnel ■ Transportation-Equipment ■ Equipment Use and Misc ■ Residual Handling



GZA GeoEnvironmental, Inc.