Brownfield Cleanup Program

Remedial Investigation Work Plan

68-19 Rego Park LLC

68-19 Woodhaven Blvd.

Queens, NY 11374

(Site No.: to be assigned)

Prepared for

68-19 Rego Park LLC
148-29 Cross Island Parkway
Queens, NY 11357

Submitted to:

New York State Department of Environmental Conservation

Prepared by

Preferred Environmental Services

323 Merrick Avenue

North Merrick, New York 11566

May 2021

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1.0 INTRODUCTION

The following Remedial Investigation Work Plan (RIWP) was prepared by Preferred Environmental Services (Preferred) on behalf of 68-19 Rego Park LLC, the Brownfield Cleanup Program (BCP) "volunteer", relative to the planned residential redevelopment and improvement of 68-19 Woodhaven Blvd., Queens, New York, BCP Site # TBD (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 Conservations (NYSDEC) Draft Brownfield Cleanup Program Guide dated May 2004. (ref. 1) and NYSDEC's DER-10 Technical Guidance for Site Investigations and Remediations (Ref. 2). The proposed scope of work discussed in this RWIP will be conducted in accordance with the Quality Assurance Project Plan (Appendix A) and the Health & Safety Plan prepared for this Site (Appendix B).

Initial limited investigations were completed on 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) and Semi-Volatile Organic Compounds (SVOCs). The following list identifies earlier studies performed at the Site. Copies of these reports were included as part of the BCP Application:

1. Restoration and Conservation Advisement Group, LLC, Phase I Report, 6819 Woodhaven Blvd., Queens, New York May 4, 2019
2. Restoration and Conservation Advisement Group, LLC Surface Phase 2 Investigation Report of 6819 Woodhaven Blvd., Queens, New York, June 10, 2019.
3. Restoration and Conservation Advisement Group, LLC Updated Characterization Report of 6819 Woodhaven Blvd., Queens New York, April 27, 2021.

The information collected from the previous investigations document that there is contamination of VOCs, and SVOCs at the Site. Additionally, the historic usage of the Site has the potential for inorganic constituents (metals) and PCB contamination in addition to the previously identified contaminants. Due to the limited nature of the previous investigations Preferred has prepared this RIWP to fully identify the nature and extent of the impacted soil, groundwater, and soil vapor 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;

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 consists of 0.600-acre irregular rectangular shaped parcel. The Site address is 68-19 Woodhaven Blvd., Queens, New York, 11374. The NYC Tax map identifies the Site as Block: 3148 Lot: 2. The Site has frontage on 68th Road and Woodhaven Blvd. Currently, the Site has a building on the Broadway side of the property. The site will be undergoing demolition. The existing tenants on the site include an auto repair shop a florist/nursery. The tenants will not interfere with the ability to conduct a complete investigation. The slab will remain in place until remediation commences. There is a small area of unpaved open space on the eastern side of the Subject Property.

The current zoning designation is R4, low density residential. The Subject Property will go through a zoning change to R6A and C2-3 for the planned development. The Site is level and has no natural or artificial surface water bodies or impoundments. According to previous reports the depth to groundwater varies from approximately 10 feet to 35 feet below ground surface. A Topographic Map and a Property Location Map are included as Figures 1 and 2, respectively.

2.2 Site History

According to the Sanborn Maps the past usage was manufacturing since at least 1932, summarized below:

1902 and 1914 – Subject Property and the surrounding area appears to be undeveloped.

1932 – The Subject Property is first developed with two buildings. One building located on the corner of 68th Road and Woodhaven Blvd that is idented as 'Mantle and Fireplace Manufacturing' and a Storage. The second building is located on the east side of the site and is identified as Concrete Burial Vault Manufacturing.

1950 – An additional structure appears to be now connecting the two structures. An addition labeled 'auto' was also constructed on the south side of the western building. A portion of the western building also appears to have been demolished for the construction of Woodhaven Blvd.

1972 – A note has been added that indicated "Paint Storage" in addition to the Concrete Burial Vault Manufacturer, storage and auto.

1981 – The entire site is occupied by an auto repair with a storage yard and garage.

1986 – 2006 By 1986 the western portion of the Property is a plant nursery.

The past usage of manufacturing and auto repair shop has likely contributed to the on-site contamination.

Summary of Historical Environmental Findings:

1. Depth to groundwater varies from between 10 feet below ground surface to 35 feet below surface grade.
2. On-site groundwater flow is generally north-northeast.
3. Bedrock was not encountered at the site during any of the previous investigations.
4. The stratigraphy of the site from the sidewalk grade consists of up to 10 feet of historic fill competing of brown sand and silt, gravel, brick, asphalt, underlain by native soil consisting of dark gray silt and sand.
5. Historic soil sampling indicate that Semi-Volatile Organic Compounds (SVOCs) were detected exceeding their respective Restricted Residential Use Soil Cleanup Objectives (SCOs). SVOCs that exhibited exceedances include, benzo(a)anthracene (17.9 mg/kg), benzo(a)pyrene (15.3 mg/kg), benzo(b)fluoranthene (14.7 mg/kg), benzo(k)fluoranthene (10.1 mg/kg), chrysene (16.5 mg/kg), indeno(1,2,3-cd)pyrene (7.560 mg/kg) and dibenzo (a,h)anthracene (3.14 mg/kg).
6. Groundwater samples previously collected resulted in Volatile Organic Compounds (VOC)– 1,2,4-Trimethylbenzene (18 ug/L), 1,3,5-Trimethylbenzene (20 ug/L), benzene (4.5 ug/L), Ethyl Benzene (30 ug/L), total Xylene (34 ug/L) and toluene (82 ug/L) and SVOCs including Naphthalene (267 ug/L).
7. Soil Vapor samples contained petroleum related VOCs present in low concentrations. Additionally, low level solvent related compounds were detected including, tetrachloroethylene (1.1 ug/m3), 111-trichloroethane (1.7 ug/m3) and carbon tetrachloride (.420 ug/m3).

2.3 Surrounding Land Use

The site is bound by roadway Woodhaven Blvd on the west and 68th Road to the south. On the north side of the Subject Property is a motel and residential walkups. The east side of the property includes

residential homes. Surrounding properties are a variety of mixed-use property including residential, commercial, and industrial uses.

2.4 Hydrogeologic Setting

The Subject Property is relatively flat and has no natural or artificial surface water bodies or impoundments. Waste from rain events run off into street storm drains on Woodhaven and 68th Road. The true depth to shallow groundwater beneath the site is unknown. According to the geotechnical report, the depth to groundwater (potentially perched) is approximately 10-feet below surface grade, according to the Phase II Investigation the depth to groundwater is approximately 35 feet below grade. It is anticipated that shallow groundwater flows to the north-northeast.

Underlying groundwater in this area of Queens is not used for potable supply purposes. New York City currently utilizes upstate reservoirs for its potable water supply, therefore no potable water resources appear to be threatens by local groundwater contamination. According to historical reports the site is underlain by historic fill material followed by native silt and sand.

2.5 Proposed Redevelopment/Project Description

Under the Brownfield Cleanup Program, the Volunteer plans to remediate the Site for the development of a newly constructed mixed-use building with parking. The gross square footage of the building will be approximately 120,00 square feet with parking on grade and below grade, a 6,000-sf ground floor commercial space and 6 stories above with 133 rental units comprised of 30% affordable and 70% free market. The affordable units will have 20% at 60% AMI and an overage average of 80% AMI. The building will include a recreational space, gym and green roof.

During the pre-development phase several professionals including developers, architects, engineers, planners and consultants will be involved in the building design and site planning. During the construction phase, estimated 18-24 months, there will be hundreds of construction personnel on site including steel workers, masons, electricians, plumbers, carpenters, laborers, subcontractors, material suppliers, etc. The developer will work with local contractors and aim to hire local residents where possible. After

construction, there will be an estimated 8 permanent jobs created by the operation of the residential building and an estimated 25 permanent jobs created by the commercial spaces.

The anticipated excavation depth for the new development will be between an estimated 10-feet below grade in most of the areas of the foundation.

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

This plan does not propose to use any historical data collected. The historical data collected was utilized to identify key contaminated of concern for the application process. A utility mark-out will be required prior to performing the subsurface investigation. The names, contact information and roles of personnel who will participate in the investigation are included in **Appendix C.**

3.2 Utility Clearance

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 will be installed through the Subject Property. The five monitoring wells will be installed into the shallow groundwater. The monitoring wells will be constructed with a 10-foot long 0.010-inch slotted well screen followed by a 10-foot riser. As the site is planned for redevelopment the monitoring wells will be furnished with a steel well casing with a lock to protect the stick-up will casing.

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

- 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, the drilling subcontractor. Wells will be developed until turbidity is less than 50 Nephelometric Turbidity Units (NTUs) for three 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 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

During this investigation, an additional round of groundwater samples will be collected from the existing groundwater monitoring wells located on the sidewalk and an initial round of groundwater sampling will be conducted from the newly installed groundwater monitoring wells. The groundwater samples

collected from the monitoring wells will be analyzed and used to evaluate the horizontal extent of the contaminant of concern in the uppermost groundwater. 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 five (5) 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 bottleware. The vials will be filled completely and checked to ensure that no air bubbles are present. Samples will be packaged in laboratory-issued sample contained by Preferred 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 Preferred. 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 Byphenols (PCBs) by USEPA Method 8082, Chlorinated Herbicides by USEPA Method 8151 and Target Analyte list (TAL) Metals via EPA

6010/7471 Series, NYSDEC List 21 Perfluorinated compounds and 1,4-Dioxane. 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 (Ref. 9). 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

Fifteen (15) soil borings will be advanced 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. One of Preferred's environmental professionals 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 below grade 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. All on-site sampling equipment will be decontaminated between each use in the following manner: laboratory

grade detergent and fresh water wash using scrub brush, followed by two fresh water 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 insure 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. Boring logs will be generated for each borehole.

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, NYSDEC List 21 Perfluorinated compounds and 1,4-Dioxane. 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 – 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 (ie. 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 (Ref. 8).

A six-inch long stainless steel screen connected to ¼-inch poly-tubing tubing will be advanced to two-feet above the groundwater interface, approximately 8 feet below surface grade and capped with a sample fitting to allow for the collection of soil gas. The annual 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 foot bentonite seal will then be emplaced above the sampling zone. The remainder of the borehole will be backfilled with clean fill.

One 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 two indoor air and 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 previous soil vapor sample locations and results as well as the proposed sampling locations are illustrated on Figure 5.

3.7 Disposal

Waste generated from remedial investigation activities including. Soil boring installation, soil vapor point installation, monitoring wells installation and subsequent sampling will be placed in drums. Samples will be collected for proper off-site disposal. Manifest documenting proper disposal will be included in the Remedial Investigation Report.

3.8 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 fresh water rinses.

3.9 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.

3.10 Health & 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 procedires 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 Remedial Investigation Reporting

Preferred will prepare a Remedial Investigation Report once field activities are completed and laboratory data are received. The Remedial Investigation Report will be prepared in general conformance with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation and at a minimum will include the following items:

- Site and project background;
- Field activities completed;
- Monitoring well logs
- Boring logs for all of the soil borings;

- Soil vapor point construction details;
- Laboratory summary tables compared to applicable guidance values;
- Maps including sample locations;
- NYSDEC Electronic Data Deliverable (EDD);
- Qualitative Exposure Assessment;
- A Data Usability Summary Report including the laboratory data;
- A water table elevation and contour map; and
- Conclusions and Recommendations for preparation of a Remedial Action Work Plan. Methodologies used to complete the field activities.

4.0 COMMUNITY RELATIONS

A detailed mailing list of contact list of near residents, businesses, public officials and citizens groups in included in the BCP Application is Section IX Attachment 8. We will update this list as needed to include any other interested parties.

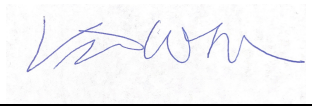
In accordance with Citizen Participation Plan prepared for this Site, this RIWP will be forward to the document repositories listed in the CPP and the RIWP Fact Sheet will be prepared and mailed to the contact list.

5.0 SCHEDULE

The following Schedule is provided for the BCP Project:

Event	Schedule
Remedial Investigation Work Plan and HASP	July 2021
30-Day Public Comment Period	August 2021
Site Investigation Field Work	September 2021
Remedial Investigation Report/Remedial Action Work Plan	November 2021
45-Day Public Comment Period	December- January 2022
Implement RAWP	March 2022
Final Engineering Report	March 2023
Site Management Plan	June 2023
Certificate of Completion	June 2023

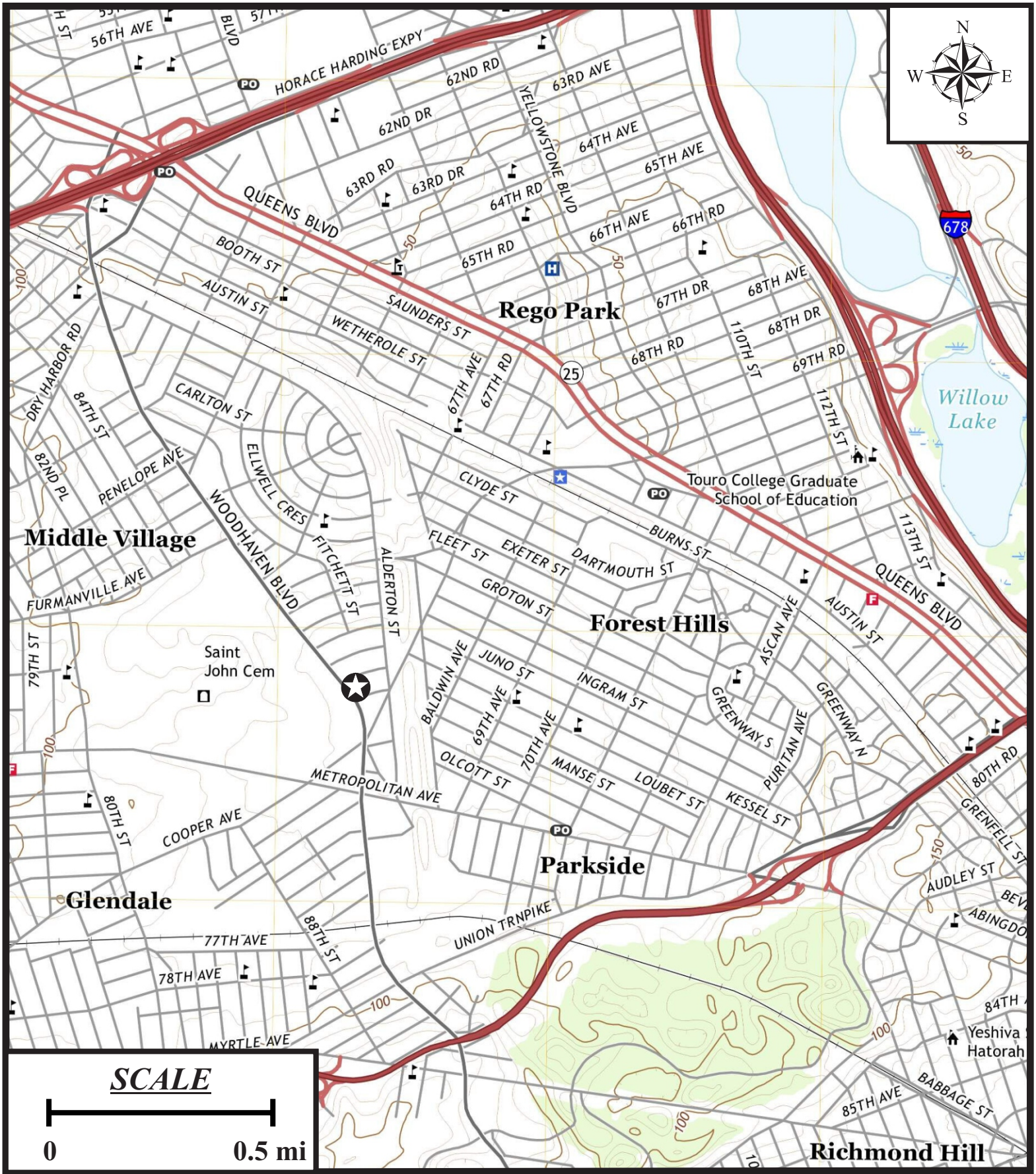
This Remedial Investigation Work Plan has been prepared by:



Victoria Whelan, NYS PG #000316

Senior Associate

Figures



SCALE

0 — 0.5 mi

Figure 1 - Topographic Map

PREFERRED ENVIRONMENTAL SERVICES

323 Merrick Avenue - North Merrick, New York 11566

Tel: (516) 546-1100 Fax : (516) 213-8156

-Approximate Location of Subject Property

Source: United States Geologic Survey Jamaica Quadrangle

Site: 68-19 Woodhaven Blvd. Rego Park, New York

Date: April 12, 2021

Figure 2 - Site Location Map

PREFERRED ENVIRONMENTAL SERVICES
323 Merrick Avenue - North Merrick, New York 11566
Tel: (516) 546-1100 Fax : (516) 213-8156

-Approximate Property Line

Source: Google Maps

Site: 68-19 Woodhaven Blvd., Rego Park, New York

Date: April 12, 2021

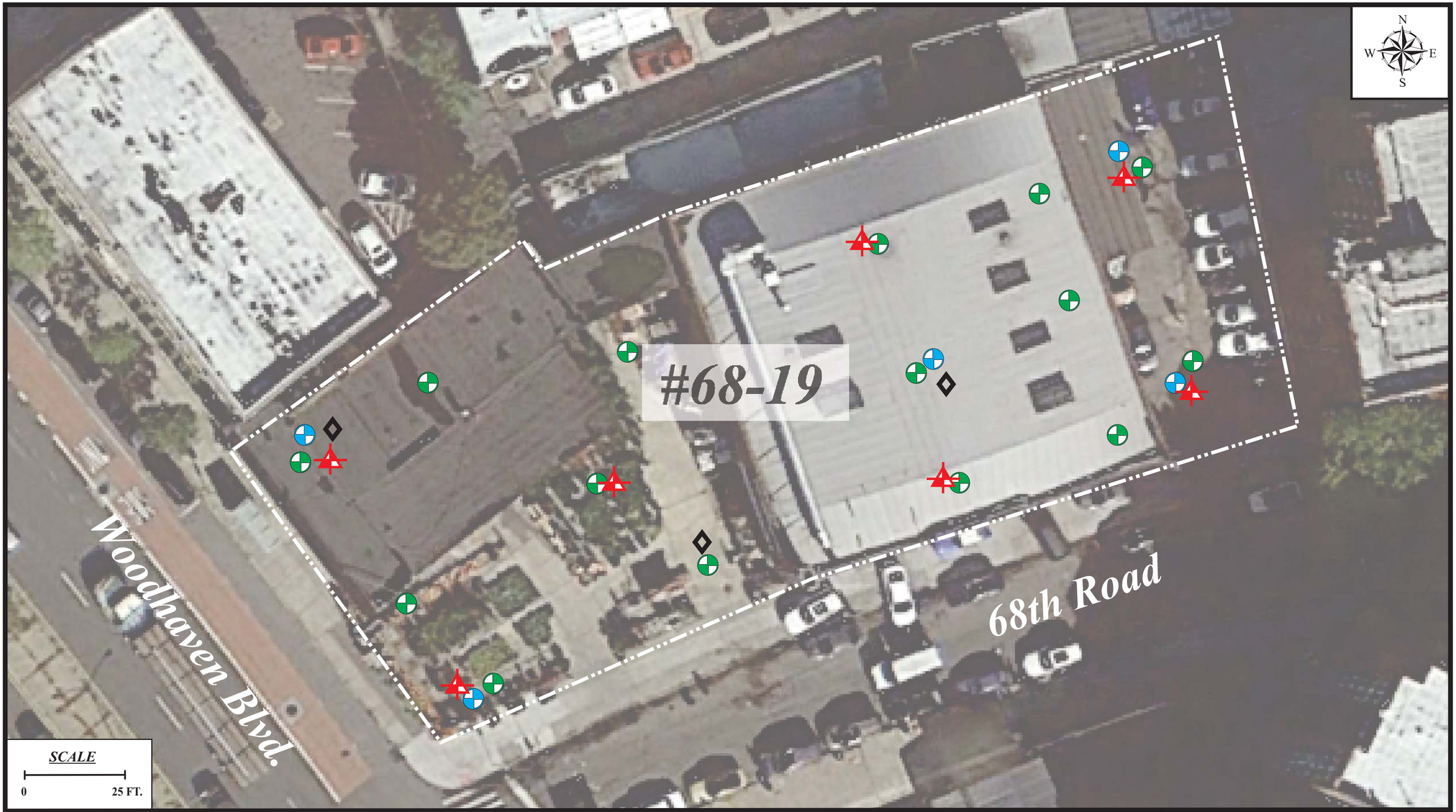


Figure 3 - Site Map with Sampling Locations

PREFERRED ENVIRONMENTAL SERVICES
323 Merrick Avenue - North Merrick, New York 11566
Tel: (516) 546-1100 Fax : (516) 213-8156

-Approximate Property Line

-Soil Boring/Sampling Location

- Groundwater Sampling Location

-Soil Vapor Sampling Location

-Ambient Air Sampling Location

Source: Google Maps

Site: 68-19 Woodhaven Boulevard, Rego Park, New York

Date: May 19, 2021

Appendix A

Quality Assurance Project Plan

Quality Assurance Sampling and Analysis Plan

for

68-19 Woodhaven Blvd.

Queens, NY 11101

BCP Site No. (to be assigned)

Prepared for

68-19 Rego Park LLC
148-29 Cross Island Parkway
Queens, NY 11357

Submitted to:

New York State Department of Environmental Conservation

Prepared by

Preferred Environmental Services

323 Merrick Avenue, North Merrick, New York 11566

May 2021

Introduction

Tables

Introduction

This Quality Assurance Project Plan (QAPP) presents the sampling and analytical methods and procedures that will be used during implementation of the Remedial Investigation Work Plan (RIWP) at the 68-19 Woodhaven Blvd., Queens NY site. The QAPP is intended to be utilized in conjunction with the RIWP and Health and Safety Plan (HASP). The RIWP presents the site background and defines the field sampling program. The HASP provides a mechanism for establishing safe working conditions at the site. The HASP is provided in Appendix B of the RIWP.

This QAPP was prepared in a manner consistent with the following reference and guidance documents:

- United States Environmental Protection Agency's (USEPA's) "Test Methods for Evaluating Solid Waste, SW-846" (USEPA, 1996).

- The USEPA's guidance document entitled "EPA Requirements for Quality Assurance Project Plans for Environmental Operations, "EPA-QA/R-5 (USEPA, 2001), which replaces QAMS-005/80 "Interim Guidance and Specifications for Preparing Quality Assurance Project Plans" (USEPA, 1980).

- The National Enforcement Investigations Center (NEIC) Policies and Procedures Manual (USEPA, 1991).

1.0 Project Organization and Responsibilities

1.1 Project Organization

The RIWP for the 68-19 Woodhaven Blvd., Queens, New York Site, will be implemented by Preferred Environmental Services and its subcontractors identified below, collectively referred to as the project team. A detailed description of the responsibilities of each member of the project team is presented in Section 2.2.

1.1.1 Overall Project Management

Preferred Environmental Services (Preferred), on behalf of the property owner, has overall technical responsibility for the implementation of the RIWP. Preferred personnel will conduct the tasks and subtasks presented in Section 3 and will be responsible for assembling resultant investigation data, and preparing the RIWP Report. A listing of project management personnel and their responsibilities is provided below.

Name	Title	Company/Organization	Phone #	Responsibility/Role
Victoria Whelan, NYS P.G.	Senior Associate/Geologist	Preferred Environmental Services	516 546 1100	Senior Project Manager
William Schlageter, P.G.	Vice President	Preferred Environmental Services	516 546 1100	Quality Assurance Manager
Bryan Comey	Senior Geologist	Preferred Environmental Services	516 546 1100	Field Task Manager
Daniel Prisco-Buxbaum	Senior Geologist	Preferred Environmental Services	516 546 1100	Health and Safety Officer
Robert Bradely	Laboratory Director	York Analytical Laboratories, Inc.	203 589-9829	Laboratory Project Manager
Chuck Blumberg	Drilling Supervisor	AARCO Environmental Services Corp.	631 586 5900	Drilling

1.2 Team Member Responsibilities

This section of the QAPP discusses the responsibilities and duties of the project team members.

1.2.1 Preferred Environmental Services

Project Manager

- Management and coordination of all aspects of the project as defined in the RIWP with an emphasis on adhering to the project objectives
- Reviews RI Report and all documents prepared by Preferred
- Assures corrective actions are taken for deficiencies cited during audits of the SC activities

Field Task Manager

- Oversight of investigation Activities
- Reduction of field data calibration and maintenance
- Review of the field instrumentation, maintenance, and calibration to maintain quality data
- Preparation of draft reports and other key documents
- Maintenance of field files of notebooks and logs, and calculations
- Instruction of Subcontractors
- Coordination of field and laboratory schedules
- Calibrate, operate, and maintain field equipment
- Reduce field data
- Maintain sample custody

- Prepare field records and logs

Quality Assurance Manager

- Review laboratory data packages
- Oversee and interface with the analytical laboratories
- Coordinate field QA/QC activities with task managers, including audits of SC activities, concentrating on field analytical measurements and practices to meet Data Quality Objectives
- Review field reports
- Review audit reports
- Prepare QA/QC report which includes an evaluation of field and laboratory data

1.2.2 York Analytical Laboratories Inc.

- Perform sample analysis
- Supply sample containers and shipping cartons
- Maintain laboratory custody of samples
- Strictly adhere to laboratory protocols

Laboratory Project Manager

- Serve as primary communication link between Preferred and laboratory staff
- Monitor workloads and ensure availability of resources
- Oversee preparation of analytical reports
- Supervise in-house chain-of-custody

Quality Assurance Officer

- Supervise technical staff in QA/QC procedures
- Conduct audits of all laboratory activities

1.2.3 AARCO Environmental Services Corp.

- Performance of monitoring well and soil boring installations in accordance with the RIWP
- Decontamination of drilling and sampling equipment

2.0 Project Background

The following summarizes background information for the site. Additional information can be found in the RIWP.

2.1 Site Description and History

2.1.1 Site Description

The Subject Property is located at 68-19 Woodhaven Blvd., Queens, New York and is identified as Block 3148 Lot 2 on the New York City Tax Map. Currently, the Subject Property is a partially developed lot with a building on the Broadway side of the property. This RIWP is part of an on-going investigation/remediation associated with Brownfield Cleanup Program(BCP).

2.2 RIWP Objectives

The overall objectives of the RIWP are to:

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

3.0 Project Description

This section presents a description of the investigation activities to be conducted during the implementation of the RIWP. Sampling activities associated with the RIWP will be conducted under the following tasks:

- Groundwater Investigation
- Soil Investigation
- Soil Vapor Intrusion Study

Sampling protocols to be followed during the investigation activities are detailed in the RIWP. Table 1 presents a list of the constituents that will be analyzed for samples collected as part of the investigation. Health and Safety protocols to be followed by field personnel during completion of the investigation activities are discussed in the Health and Safety Plan (HASP). A detailed description can be found in the associated RIWP.

4.0 Quality Objectives and Criteria for Measurement Data

The DQO process, as described in the USEPA QA/G-5 QAPP instructions document (USEPA, 2002b), is intended to provide a "logical framework" for planning field investigations. The following section addresses, in turn, each of the seven sequential steps in the USEPA QA/G-5 QAPP DQO process.

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during site-related activities and are based on the end uses of the data to be collected. Preliminary DQOs were identified to ensure that the data generated during field investigations will be of adequate quality and sufficient quantity to form a sound basis for decision making relative to the above objectives. Data quality objectives have been specified for each data collection activity or investigation. The DQOs presented herein address investigation efforts only and do not cover health and safety issues, which are addressed in detail in the HASP for this project.

For this project, data reporting requirements have been defined as follows: Level 3 – Full Reporting: Full "CLP-type" reporting is used for those analyses that, based on intended data use, require full documentation. This reporting level would include ASP Superfund and Category B reporting.

The analytical methods to be used during the RIWP implementation will be USEPA SW-846 methods with New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) Revision 2005, QA/QC requirements and Category B reporting deliverables.

To obtain information necessary to meet the SC objectives stated above in Section 2.3, the following task will be performed (Note: Only subtasks that require collection and analysis of environmental samples or collecting field measurements are listed below. Refer to the RIWP for a description of the tasks and subtasks.):

- Soil, Groundwater and Soil Vapor Sampling

A description of the DQOs for the implementation of the RIWP is presented below.

4.1 DQOs for Sampling

The site characterization samples will be submitted for laboratory analysis for the following:

- TAL VOCs by Method 8260
- TAL SVOCs by Method 8270
- Organochlorine Pesticides by USEPA Method 8081
- Polychlorinated Byphenols (PCBs) by USEPA Method 8082
- Chlorinated Herbicides by USEPA Method 8151; and
- TAL Metals via EPA 6010/7471 Series.
- NYSDEC List 21 Perfluorinated compounds; and
- 1,4-Dioxane

The number of soil samples that will be collected, including QA/QC samples, is summarized in **Table 1**. **Table 2** presents the parameters to be analyzed under each of the methods described above with the laboratory quantitation limits.

5.0 Special Training Requirements/Certification

Compliant with the Occupational Safety and Health Administration's (OSHA's) final rule, "Hazardous Waste Operations and Emergency Response," 29 CFR§1910.120(e), all personnel performing remedial activities at the site will have completed the requirements for OSHA 40-hour Hazardous Waste Operations and Emergency Response training.

6.0 Documentation and Records

6.1 General

Samples of the various media will be collected as described in the RIWP. Detailed descriptions of the documentation and reporting requirements are presented below.

6.2 Field Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and sample chain-of-custody. This documentation constitutes of a record that allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the field work will be retained in the project file. The various forms of documentation to be maintained throughout the action include:

- Daily Production Documentation – A field notebook consisting of a waterproof, bound notebook that will contain a record of all activities performed at the site.

- Sampling Information – Detailed notes will be made as to the exact site of sampling, physical observations, and weather conditions (as appropriate).

- Sample Chain-of-Custody – Chain-of-custody (COC) forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. The original COC form will accompany the samples to the laboratory, and copies will be forwarded to the project files. A sample COC form is included in **Appendix A**. Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

- Field Equipment, Calibration, and Maintenance Logs – To document the calibration and maintenance of field instrumentation, calibration and maintenance logs will be maintained for each piece of field equipment that is not factory-calibrated.

6.3 Laboratory Documentation

6.3.1 Laboratory Project Files

The laboratory will establish a file for all pertinent data. The file will include all correspondence, faxed information, phone logs, and COC forms. The laboratory will retain all project files and data packages for a period of 5 years.

6.3.2 Laboratory Logbooks

Workbooks, bench sheets, instrument logbooks, and instrument printouts will be used to trace the history of samples through the analytical process and document and relate important aspects of the work, including the associated quality controls. As such, all logbooks, bench sheets, instrument logs, and instrument printouts will be part of the permanent record of the laboratory.

Each page or entry will be dated and initialed by the analyst at the time of entry. Errors in entry will be crossed out in indelible ink with a single stroke, corrected without the use of whiteout or by obliterating or writing directly over the erroneous entry, and initialed and dated by the individual making the correction. Pages of logbooks that are not used will be completed by lining out unused portions.

Information regarding the sample, analytical procedures performed, and the results of the testing will be recorded on laboratory forms or personal notebook pages by the analyst. These notes will be dated and will also identify the analyst, the instrument used, and the instrument conditions. Laboratory notebooks will be periodically reviewed by the laboratory group leaders for accuracy, completeness, and compliance to this QAPP. All entries and calculations will be verified by the laboratory group leader. If all entries on the pages are correct, then the laboratory group leader will initial and date the pages. Corrective action will be taken for incorrect entries before the laboratory group leader signs.

6.3.3 Electronic File Storage

All electronic files will be maintained on Preferred's company network server for 5 years.

6.4 Data Reporting Requirements

6.4.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks or data sheets and/or on forms. Such data will be reviewed by the appropriate Task Manager for adherence to the Work Plan and for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

Where appropriate, field data forms and calculations will be processed and included in appendices to a Site Action Report (when generated). The original field logs, documents, and data reductions will be kept in the project file at the Preferred office in Merrick, New York.

6.4.2 Laboratory Data Reporting

The laboratory is responsible for preparing ASP Category B data packages. All data reports for all parameters will include, at a minimum, the following items:

Narrative: Summary of activities that took place during the course of sample analysis, including the following information:

- Laboratory name and address
- Date of sample receipt
- Cross reference of laboratory identification number to contractor sample identification
- Analytical methods used
- Deviations from specified protocol
- Corrective actions taken

Included with the narrative will be any sample handling documents, including field and internal COC forms, air bills, and shipping tags.

Analytical Results: Reported according to analysis type and including the following information, as acceptable:

- Sample ID
- Laboratory ID
- Date of collection
- Date of receipt
- Date of extraction
- Date of analysis
- Detection limits

Sample results on the report forms will be collected for dilutions. Soil samples will be reported on a dry weight basis. Unless otherwise specified, results will be reported uncorrected for blank contamination.

The data analyses will be expanded to include all supporting documentation necessary to provide a Category B package. This additional documentation will include, but is not limited to, all raw data required to recalculate any result, including printouts, chromatograms, and quantitation reports.

6.5 Project File

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation when received) and field data will be filed with notes and data. Filed materials may be removed and signed out by authorized personnel on a temporary basis only.

7.0 Sampling Process Design

Information regarding the sampling design and rationale and associated sampling locations can be found in the RIWP.

8.0 Sampling Method Requirements

The RIWP contains the procedures that will be followed to collect groundwater, air and macro core samples; perform field measurements; and handle, package, and ship collected samples.

9.0 Sample Handling and Custody Requirements

9.1 Sample Containers and Preservation

Appropriate sample containers, preservation methods, and laboratory holding times for the samples are shown in **Table 3**.

The analytical laboratory will supply appropriate sample containers and preservatives, as necessary. The bottles will be purchased pre-cleaned to USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9240.05A requirements. The field personnel will be responsible for properly labeling containers and preserving samples (as appropriate).

9.2 Packing, Handling, and Shipping Requirements

Sample packaging and shipment procedures are designed to insure that the samples will arrive at the laboratory, with the COC, intact. Samples will be packaged for shipment as outlined below:

- Ensure that all sample containers have the sample labels securely affixed to the container.
- Check the caps on the sample containers to ensure that they are properly sealed.
- Complete the COC form with the required sampling information and ensure the recorded information matches the sample labels. NOTE: If the designated sampler relinquishes the samples to other sampling or field personnel for packing or other purposes, the sampler will complete the COC prior to this transfer. The appropriate personnel will sign and date the COC form to document the sample custody transfer.
- Ice layer.
- Place the sealed sample containers into the cooler.
- Place ice in plastic bags and seal. Place loosely in the cooler.
- Place COC forms in a plastic bag and seal.
- Close the lid of the cooler, lock, and secure with duct tape.

• Wrap strapping tape around both ends of the cooler at least twice.

All samples will be packaged by the field personnel and transported as low concentration environmental samples. The samples will be hand-delivered or by courier within 48 hours of the time of collection. All shipments will be accompanied by the COC form identifying the contents. The original form will company the shipment; copies will be retained by the sampler for the sampling office records. If the samples are

sent by common carrier, a bill of lading should be used. Receipts or bills of lading will be retained as part of the permanent project documentation. Commercial carriers are not required to sign off on the COC form, as long as the forms are sealed inside the sample cooler and the custody seals remain intact.

Sample custody seals and packing materials for filled sample containers will be provided by the analytical laboratory. The filled, labeled, and sealed containers will be placed in a cooler on ice and carefully packed to eliminate the possibility of container breakage. Trip blank(s) of analyte-free water will be provided by the laboratory and included in each cooler containing aqueous samples to be analyzed for VOCs.

9.3 Field Custody Procedures

The objective of field sample custody is to assure that samples are not tampered with from the time of sample collection through the time of transport to the analytical laboratory. Persons will have "custody of samples" when the samples are in their physical possession, in their view after being in their possession, or in the physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

Field custody documentation consists of both field logbooks and field COC forms.

9.3.1 Field Logbooks

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory. Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in a secure location when not in use. Each logbook will be identified by the project-specific document number. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned
- Logbook number
- Project name
- 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, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel, and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink, and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected or a measurement is made, a detailed description of the location

of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. Sample identification numbers will be assigned prior to sample collection.

Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

9.3.2 Sample Labeling

Preprinted sample labels will be affixed to sample bottles prior to delivery at the sampling site. The following information is required in each sample label.

- Project
- Date collected
- Location
- Sample number

9.3.3 Field Chain-of-Custody Forms

Completed COC forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory. Copies of the COC will be made prior to shipment (or multiple copy forms used) for field documentation. The COC forms will remain with the samples at all times. The samples and signed COC forms will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express) or hand delivered to a mobile or permanent laboratory, or placed in secure storage.

Sample labels will be completed for each sample using waterproof ink, unless prohibited by weather conditions. The labels will include sample information, such as: sample number and location, type of sample, date and time of sampling, sampler's name or initials, preservation, and analyses to be performed. The completed sample labels will be affixed to each sample bottle. Whenever samples are co-located with a source or government agency, a separate Sample Receipt will be prepared for those samples and marked to indicate with whom the samples are being co-located. The person relinquishing the samples to the facility or agency should request the representative's signature, acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space.

9.4 Management of Investigation-Derived Materials and Wastes

Disposable equipment, debris, and decontamination rinsate (e.g., tap and distilled water containing small amounts of solvent) will be containerized during the sampling events and labeled for appropriate disposal.

9.5 Laboratory Procedures

9.5.1 General

Upon sample receipt, laboratory personnel will be responsible for sample custody. A field chain-of-custody form will accompany all samples requiring laboratory analysis. Samples will be kept secured in the laboratory until all stages of analysis are complete. All laboratory personnel having samples in their custody will be responsible for maintaining sample integrity.

9.5.2 Sample Receipt and Storage

Upon sample receipt, the laboratory sample custodian will verify the package seal, open the package, verify the sample integrity, and compare the contents against the field chain-of-custody. If a sample container is broken, the sample is in an inappropriate container, has not been preserved by appropriate means, or if there is a discrepancy between the chain-of-custody and the sample shipment, Preferred will be notified. The laboratory sample custodian will then log the samples in, assign a unique laboratory identification number to each, and label the sample bottle with the laboratory identification number. The project name, field sample code, date sampled, date received, analysis required, storage location and date, and action for final disposition will be recorded in the laboratory information management system. If the sample container is broken, the sample is in an inappropriate container, or has not been preserved by appropriate means, Preferred will be notified.

9.5.3 Sample Chain-of-Custody and Documentation

Laboratory chain-of-custody and documentation will follow industry procedures.

9.5.4 Sample Analysis

Analysis of an acceptable sample will be initiated by worksheets that contain all pertinent information for analysis. The analyst will sign and date the laboratory COC form when removing the samples from storage.

Samples will be organized into sample delivery groups (SDGs) by the laboratory. An SDG may contain up to 20 field samples (field duplicates, trip blanks, and rinse blanks are considered field samples for the purposes of SDG assignment). All field samples assigned to a single SDG shall be received by the laboratory over a maximum of 7 calendar days, and must be processed through the laboratory (preparation, analysis, and reporting) as a group. Every SDG must include a minimum of one site-specific matrix/matrix spike duplicate (MS/MSD) pair, which shall be received by the laboratory at the start of the SDG assignment.

Each SDG will be self-contained for all of the required quality control samples. All parameters within an SDG will be extracted and analyzed together in the laboratory. At no time will the laboratory be allowed to run any sample (including QC samples) at an earlier or later time than the rest of the SDG. These rules for analysis will ensure that the QC samples for an SDG are applicable to the field samples of the same SDG and that the best possible comparisons can be made.

9.5.5 Sample Storage Following Analysis

The remaining samples will be maintained by the laboratory for 1 month after the final report is delivered to Preferred. After this period, the samples will be disposed of in accordance with applicable rules and regulations.

10.0 Analytical Procedures

10.1 Field Analytical Procedures

Field analytical procedures will include the measurement of VOCs utilizing a Photo-Ionization Detector (PID) and groundwater quality parameters utilizing a Horiba.

10.2 Laboratory Analytical Procedures

Laboratory analytical requirements presented in the sub-sections below include a general summary of requirements, specifics related to each sample medium to be analyzed, and details of the methods to be used for this project. SW-846 methods with NYSDEC, ASP, 2005 Revision, QA/QC and reporting deliverables requirements will be used for all analytes.

10.2.1 Investigation Sample Matrices

10.2.1.1 Surface Soils

Analyses in this category will relate to soil and sediments samples. Analyses will be performed following the methods listed in **Table 1**. Results will be reported as dry weight, in units presented in **Table 2**. Moisture content will be reported separately.

10.2.3 Analytical Requirements

The primary sources to describe the analytical methods to be used during the investigation are provided in USEPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition and USEPA Methods for Chemical Analysis of Water and Waste with NYSDEC ASP 2005 Revision, QA/QC and reporting deliverables requirements.

Detailed information regarding quality control procedures including matrix spike, matrix spike duplicates, matrix spike blanks, and surrogate recoveries is provided in NYSDEC, ASP 2005 Revision.

11.0 Quality Control Requirements

11.1 Quality Assurance Indicators

The overall quality assurance objective for this QAPP is to develop and implement procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action such that valid data will be generated. These procedures are presented or referenced in the following sections of the QAPP. Specific QC checks are discussed in Section 11.2.

Quality assurance indicators are generally defined in terms of five parameters:

1. Representativeness
2. Comparability
3. Completeness
4. Precision
5. Accuracy

Each parameter is defined below. Specific objectives for the site actions are set forth in other sections of this QAPP, as referenced below.

11.1.1 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability. The investigation has been designed to assess the presence of the constituents at the time of sampling. The Work Plan presents the rationale for sample quantities and location. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data.

11.1.2 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between this investigation, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodology set forth in the FSP and this QAPP, SW-846 analytical methods with NYSDEC ASP Revision 2005 QA/QC requirements and Category B reporting deliverables, and through use of QA/QC procedures and appropriately trained personnel.

11.1.3 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the amount that was expected to be obtained under normal conditions. This will be determined upon assessment of the analytical results, as discussed in Section 11.6.

11.1.4 Precision

Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the project objectives. To maximize precision, sampling and analytical

procedures will be followed. All work for this investigation will adhere to established protocols presented in the SC Work Plan.

Checks for analytical precision will include the analysis of matrix spike duplicates, laboratory duplicates and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision QC checks is provided in Section 11.4.

11.1.5 Accuracy

Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, internal standards, matrix spikes, blank spikes, and surrogates (system monitoring compounds) will be used to assess the accuracy of the laboratory analytical data. Further discussion of these QC samples is provided in Section 11.4.

11.2 Field Quality Control Checks

11.2.1 Field Measurements

To verify the quality of data using field instrumentation, duplicate measurements will be obtained and reported for all field analytical measurements.

11.2.2 Sample Containers

Certified-clean sample containers in accordance with Exhibit I of the NYSDEC ASP Revision 2005 (Eagle Picher pre-cleaned containers or equivalent) will be supplied by the laboratory.

11.2.3 Field Duplicates

Field duplicates will be collected for soil samples to check reproducibility of the sampling methods. Soil sample field duplicates will be analyzed at a 5 percent frequency (every 20 samples). Table 1 provides an estimated number of field duplicates for each applicable parameter and matrix.

11.2.4 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Rinse blanks will be prepared and submitted for analysis at a frequency of one per day (when sample equipment cleaning occurs) or once for every 20 samples collected, whichever is less. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory) which has been routed through a cleaned sampling device. When dedicated sampling devices are used or sample containers are used to collect the samples, rinse blanks will not be necessary. Table 1 provides an estimated number of rinse blanks collected during the investigation.

11.2.5 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to onsite related volatile constituents during storage and transport. Trip blanks will be analyzed at a frequency of once per day, per

cooler containing soil samples to be analyzed for volatile organic constituents. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory) which remains unopened with field samples throughout the sampling event. Trip blanks will only be analyzed for aqueous volatile organic constituents. Table 1 provides an estimated number of trip blanks collected for each matrix and parameter during the investigation.

11.3 Analytical Laboratory Quality Control Checks

Internal quality control procedures are specified in the analytical methods. These specifications include the types of QC checks required (method blanks, reagent/preparation blanks, matrix spike and matrix spike duplicates (MS/MSD), calibration standards, internal standards, surrogate standards, the specific calibration check standards, laboratory duplicate/replicate analysis), compounds and concentrations to be used, and the QC acceptance criteria.

11.3.1 Method Blanks

Method blanks will serve as a measure of contamination attributable to a variety of sources including glassware, reagents, and instrumentation. The method blank will be initiated at the beginning of an analytical procedure and is carried through the entire process.

11.3.2 Matrix Spike/Matrix Spike Duplicates

The MS will serve as a measure of method accuracy in a given matrix. The MS and the MSD together will serve as a measure of method precision.

11.3.3 Surrogate Spikes

Surrogate spikes are organic compounds that have similar properties to those being tested. They will serve as indicators of method performance and accuracy in organic analyses.

11.3.4 Laboratory Duplicates

Laboratory duplicates will serve to the measure method precision in inorganic and supplemental analyses. instrument set-up, and the premises inherent in quantitation. Reference standards will be analyzed at the frequencies specified within the analytical methods.

11.4 Data Precision Assessment Procedures

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the entire measurement system including sampling, handling, shipping, storage, preparation, and analysis.

Laboratory data precision for organic analyses will be monitored through the use of MSD, laboratory duplicate, and field duplicates as identified in Table 1. The precision of data will be measured by calculation of the relative percent differences (RPDs) of duplicate sample sets. The RPD can be calculated by the following equation:

$$RPD = \frac{(A-B)}{(A+B)/2} \times 100$$

Where:

A = Analytical result from one of two duplicate measurements.

B = Analytical result from the second measurement.

Precision objectives for matrix spike duplicate and laboratory duplicate analyses are identified in the NYSDEC ASP Revision 2005.

11.5 Data Accuracy Assessment Procedures

The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs. Laboratory accuracy will be assessed via the use of matrix spikes, surrogate spikes, and internal standards. Where available and appropriate, QA performance standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated as a percent recovery as follows:

$$Accuracy = \frac{A-X}{B} \times 100$$

Where:

A = Value measured in spiked sample or standard. X = Value measured in original sample. B = True value of amount added to sample or true value of standard.

This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy. Accuracy objectives for matrix spike recoveries and surrogate recovery objectives are identified in the NYSDEC ASP, 2005 Revision.

11.6 Data Completeness Assessment Procedures

Completeness of a field or laboratory data set will be calculated by comparing the number of samples collected or analyzed to the proposed number.

$$Completeness = \frac{\text{No. Valid Samples Collected or Analyzed}}{\text{No. Proposed Samples Collected or Analyzed}} \times 100$$

As general guidelines, overall project completeness is expected to be at least 90 percent. The assessment of completeness will require professional judgment to determine data usability for intended purposes.

12.0 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Preventive maintenance schedules have been developed for both field and laboratory instruments. A summary of the maintenance activities to be performed is presented below.

12.1 Field Instruments and Equipment

Prior to any field sampling, each piece of field equipment will be inspected to assure it is operational. If the equipment is not operational, it must be serviced prior to use. All meters which require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, it is the responsibility of the Field Activities Task Manager to follow the maintenance schedule and arrange for prompt service. Field instrumentation to be used in this study includes a Photo-Ionization Detector (PID).

A logbook will be kept for each field instrument. Each logbook contains records of operation, maintenance, calibration, and any problems and repairs. The Field Activities Task Manager will review calibration and maintenance logs.

Field equipment returned from a site will be inspected to confirm it is in working order. This inspection will be recorded in the logbook or field notebooks as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook. Non-operational field equipment will be either repaired or replaced. Appropriate spare parts will be made available for field meters. A summary of preventive maintenance requirements for field instruments, and details regarding field equipment maintenance, operation, and calibration, are provided in the FSP.

12.2 Laboratory Instruments and Equipment

12.2.1 General

Only qualified personnel will service instruments and equipment. Repairs, adjustments, and calibrations are documented in the appropriate logbook or data sheet.

12.2.2 Instrument Maintenance

Preventive maintenance of laboratory equipment will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired by inhouse staff or through a service call by the manufacturer as appropriate. The laboratory will maintain a sufficient supply of spare parts for its instruments to minimize downtime. Whenever possible, backup instrumentation will be retained. Whenever practical, analytical equipment will be maintained under a service contract. The contract allows for preventative system maintenance and repair on an “as-needed” basis. The laboratory has sufficiently trained staff to allow for the day-to-day maintenance of equipment.

12.2.3 Equipment Monitoring

On a daily basis, the operation of balances, incubators, ovens, refrigerators, and water purification systems will be checked and documented. Any discrepancies will be immediately reported to the appropriate laboratory personnel for resolution.

13.0 Instrument Calibration and Frequency

13.1 Field Equipment Calibration Procedures and Frequency

Field equipment operation, calibration, and maintenance procedures are provided in the FSP section of the RIWP.

13.2 Laboratory Equipment Calibration Procedures and Frequency

Instrument calibration will follow the specifications provided by the instrument manufacturer or specific analytical method used. Equipment calibration procedures will follow guidelines presented in NYSDEC ASP 2005 Rev, Exhibit E.

14.0 Inspection/Acceptance Requirements for Supplies and Consumables

The laboratory shall inspect/test all supplies and consumables prior to use with SC samples. Documentation shall be maintained for all associated testing and analyses.

15.0 Data Acquisition Requirements for Non-direct Measurements

At this point in time, historical data generated by outside parties is not anticipated to be used directly in completing the investigation. However, historical data will be used as guidance in determining sampling locations for the investigation.

Prior to their use, historic data sets have been reviewed according to the procedures identified in subsequent sections of this QAPP to determine the appropriate uses of such data. The extent to which these data can be validated will be determined by the analytical level and QC data available. The evaluation of historic data for investigation purposes requires the following:

- Identification of analytical levels
- Evaluation of QC data, when available
- Development of conclusions regarding the acceptability of the data for intended uses

Acceptability of historic data for intended uses will be determined by application of these procedures and professional judgment. If the historic data quality cannot be determined, its use will be limited to general trend evaluations.

16.0 Data Management

The purpose of the data management is to ensure that all of the necessary data are accurate and readily accessible to meet the analytical and reporting objectives of the project. The field investigations will encompass a large number of samples and a variety of sample matrices and analytes from a large geographic area. From the large amount of resulting data, the need arises for a structured, comprehensive, and efficient program for management of data.

The data management program established for the project includes field documentation and sample QA/QC procedures, methods for tracking and managing the data, and a system for filing all site-related

information. More specifically, data management procedures will be employed to efficiently process the information collected such that the data are readily accessible and accurate. These procedures are described in detail in the following section.

The data management plan has five elements:

1. Sample designation system
2. Field activities
3. Sample tracking and management
4. Data management system
5. Document control and inventory

16.1 Sample Designation System

A concise and easily understandable sample designation system is an important part of the project sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy re-sampling of select locations to evaluate data gaps, if necessary. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events or conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected.

16.2 Field Activities

Field activities designed to gather the information necessary to make decisions regarding the off-site areas require consistent documentation and accurate record keeping. During site activities, standardized procedures will be used for documentation of field activities, data security, and QA. These procedures are described in further detail in the following subsections.

16.2.1 Field Documentation

Complete and accurate record keeping is a critical component of the field investigation activities. When interpreting analytical results and identifying data trends, investigators realize that field notes are an important part of the review and validation process. To ensure that all aspects of the field investigation are thoroughly documented, several different information records, each with its own specific reporting requirements, will be maintained, including:

- Field logs
- Instrument calibration records
- Chain-of-custody forms

A description of each of these types of field documentation is provided below.

Field Logs

The personnel performing the field activities will keep field logs that detail all observations and measurements made during the investigation. Data will be recorded directly into site-dedicated, bound

notebooks, with each entry dated and signed. To ensure at any future date that notebook pages are not missing, each page will be sequentially numbered. Erroneous entries will be corrected by crossing out the original entry initialing it, and then documenting the proper information.

Instrument Calibration Records

As part of data quality assurance procedures, field monitoring and detection equipment will be routinely calibrated. Instrument calibration ensures that equipment used is of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and desired results. Calibration procedures for the various types of field instrumentation are described in Section 13.1. In order to demonstrate that established calibration procedures have been followed, calibration records will be prepared and maintained to include, as appropriate, the following:

- Calibration date and time
- Type and identification number of equipment
- Calibration frequency and acceptable tolerances
- Identification of individual(s) performing calibration
- Reference standards used
- Calibration data
- Information on calibration success or failure

The calibration record will serve as a written account of monitoring or detection equipment QA. All erratic behavior or failures of field equipment will be subsequently recorded in the calibration log.

Chain-of-Custody Forms

COC forms are used as a means of documenting and tracking sample possession from time of collection to the time of disposal. A COC form will accompany each field sample collected, and one copy of the form will be filed in the field office. All field personnel will be briefed on the proper use of the COC procedure.

16.2.2 Data Security

Measures will be taken during the field investigation to ensure that samples and records are not lost, damaged, or altered. When not in use, all field notebooks will be stored at the field office in a locked cabinet. Access to these files will be limited to the field personnel who utilize them.

16.3 Sample Management and Tracking

A record of all field documentation, as well as analytical and QA/QC results, will be maintained to ensure the validity of data used in the site analysis. To effectively execute such documentation, carefully constructed sample tracking and data management procedures will be used throughout the sampling program.

Sample tracking will begin with the completion of COC forms, as described in Section 9.3.3. On a daily basis, the completed COC forms associated with samples collected that day will be faxed from the project

office to the QAM. Copies of all completed COC forms will be maintained in the field office. On the following day, the QAM will telephone the laboratory to verify receipt of samples.

When analytical data are received from the laboratory, the QAM will review the incoming analytical data packages against the information on the COCs to confirm that the correct analyses were performed for each sample and that results for all samples submitted for analysis were received. Any discrepancies noted will be promptly followed-up by the QAM.

16.4 Data Management System

In addition to the sample tracking system, a data management system may be implemented. The central focus of the data management system will be the development of a personal computer-based project database. The project database, to be maintained by the Database Administrator, will combine pertinent geographical, field, and analytical data. Information that will be used to populate the database will be derived from three primary sources: sample locations, field observations, and analytical results. Each of these sources is discussed in the following sections.

16.4.1 Computer Hardware

If required, the database will be constructed on Pentium®-based personal computer work stations connected through a Novell network server. The Novell network will provide access to various hardware peripherals, such as laser printers, backup storage devices, image scanners, modems, etc. Computer hardware will be upgraded to industrial and corporate standards, as necessary, in the future.

16.4.2 Computer Software

The database will running in a Windows operating system.

16.4.3 Analytical Results

Analytical results provided by the laboratory will generally be available in both a digital and a hard copy format. Upon receipt of each analytical package, the original COC form will be placed in the project files. The data packages will be examined to ensure that the correct analyses were performed for each sample submitted and that all of the analyses requested on the COC form were performed. If discrepancies are noted, the QAM will be notified and will promptly follow up with the laboratory to resolve any issues.

Digital files will be used to populate the appropriate database tables. The format of the table will specify one data record for each constituent for each sample analyzed. Specific fields include:

- sample identification number
- date sampled
- date analyzed
- parameter name
- analytical result
- units
- detection limit

- qualifier(s)

The individual EDDs, supplied by the laboratory in either an ASCII comma separated value (CSV) format or in a Microsoft Excel worksheet, will be loaded into the appropriate database table. Any analytical data that cannot be provided by the laboratory in electronic format will be entered manually.

After entry into the database, the EDD data will be compared to the field information previously entered into the database to confirm that all requested analytical data have been received.

16.5 Document Control and Inventory

Preferred maintains project files in its Merrick, New York office. Each client project is assigned a file/job number. Each file is then broken down into the following subfiles:

- #1- Administrative - all agreements and contracts involving the off-site investigations
- #2- Correspondence - all external correspondence, including report comments, all internal and external memoranda
- #3 Field Work Documentation – notes, photographs, logs and data from field, activities
- # 4 Reporting – reports, laboratory data, figures etc.

Originals, when possible, are placed in the files. These are the central files and will serve as the site-specific files for the investigations.

17.0 Assessment and Response Actions

Performance and systems audits will be completed in the field and the laboratory during the SC as described below.

17.1 Field Audits

The following field performance and systems audits will be completed during this project.

17.1.1 Performance Audits

The Project Manager will monitor field performance. Field performance audit summaries will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols.

The Quality Assurance Manager will review all field reports and communicate concerns to the Project Manager, as appropriate. In addition, the Quality Assurance Manager will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures.

17.1.2 Internal Systems Audits

A field internal systems audit is a qualitative evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities from this document with actual QA/QC activities completed. The Project Manager will periodically confirm that work is being performed consistent with the RIWP, and the HASP.

17.2 Laboratory Audits

The laboratory will perform internal audits consistent with NYSDEC ASP, 2005 Revision. In addition to the laboratory's internal audits and participation in state and federal certification programs, the laboratory sections at the laboratory are audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on an annual basis and focus on laboratory conformance to the specific program protocols for which the laboratory is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation, and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action, if necessary.

17.3 Corrective Action

Corrective actions are required when field or analytical data are not within the objectives specified in this QAPPor the Work Plan. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures are described below.

17.3.1 Field Procedures

When conducting field work, if a condition is noted that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented will be documented on a Corrective Action Report Form and reported to the Project Manager.

Examples of situations that would require corrective actions are provided below:

1. Protocols as defined by this QAPP or the RIWP have not been followed.
2. Equipment is not in proper working order or properly calibrated.
3. QC requirements have not been met.
4. Issues resulting from performance or systems audits.

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

17.3.2 Laboratory Procedures

In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action to be taken will be documented, and reported to the Project Manager.

Corrective action may be initiated, at a minimum, under the following conditions:

1. Specific laboratory analytical protocols have not been followed.
2. Predetermined data acceptance standards are not obtained.
3. Equipment is not in proper working order or calibrated.
4. Sample and test results are not completely traceable.

5. QC requirements have not been met.
6. Issues resulting from performance or systems audits.

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

18.0 Reports to Management

18.1 Internal Reporting

The analytical laboratory will submit analytical reports to Preferred for review. Supporting data (i.e., historic data, related field or laboratory data) will also be reviewed to evaluate data quality, as appropriate. The Quality Assurance Manager will incorporate results of the data review into a summary report (if required).

18.2 Reporting

Upon sample transport to the laboratory, a copy of the chain-of-custody will be forwarded to National Fuel. Upon receipt of the ASP - Category B Data Package from the laboratory, the Quality Assurance Manager will determine if the data package has met the required data quality objectives. The analytical data package will also be incorporated into the Report.

19.0 Data Review and Verification

After field and laboratory data are obtained, these data will be subject to:

1. Reduction or manipulation of the data mathematically or otherwise into meaningful and useful forms
2. Organization, interpretation, and reporting of the data

19.1 Field Data Reduction, Validation, and Reporting

19.1.1 Field Data Reduction

Information that is collected in the field through visual observation, manual measurement and/or field instrumentation will be recorded in field notebooks, log sheets, and/or other appropriate forms. Such data will be reviewed by the Project Manager for adherence to the Work Plan and consistency of data. Any concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and as necessary incorporated into the data evaluation process.

19.1.1.1 Task 1 – Soil Investigation

The specific data reduction activity that will be performed during Task 1 is:

- Mapping of areas impacted with targeted CVOCs based on findings of the soil-boring program

19.1.2 Field Data Reporting

Where appropriate, field data forms and calculations will be processed and included in appendices to the Report. The original field logs, documents, and data reductions will be kept in the project.

19.2 Laboratory Data Reduction, Review, and Reporting

19.2.1 Laboratory Data Reduction

Laboratory analytical data will be directly transferred from the instrument to the computer or the data reporting form (as applicable). Calculation of sample concentrations will be performed using the appropriate regression analysis program, response factors, and dilution factors (where applicable).

19.2.2 Laboratory Data Review

All data will be subject to multi-level review by the laboratory. The group leader will review all data reports prior to release for final data report generation, and the laboratory director will review a cross section of the final data reports. All final data reports are reviewed by the laboratory QAM prior to shipment to Preferred.

If discrepancies or deficiencies exist in the analytical results, then corrective action will be taken, as discussed in Section 17. Deficiencies discovered as a result of internal data review, as well as the corrective actions to be used to rectify the situation, will be documented on a Corrective Action Form. This form will be submitted to the Preferred Project Manager.

20.0 Reconciliation with User Requirements

The data results will be examined to determine the performance that was achieved for each data usability criteria. The performance will then be compared with the project objectives. Of particular note will be samples at or near action levels. All deviations from objectives will be noted. Additional action may be warranted when performance does not meet performance objectives for critical data. Action options may include any or all of the following:

- Retrieval of missing information
- Request for additional explanation or clarification
- Reanalysis of sample from extract (when appropriate)
- Recalculation or reinterpretation of results by the laboratory

These actions may improve the data quality, reduce uncertainty, and may eliminate the need to qualify or reject data. If these actions do not improve the data quality to an acceptable level, the following actions may be taken:

- Extrapolation of missing data from existing data points
- Use of historical data
- Evaluation of the critical/non-critical nature of the sample

If the data gap cannot be resolved by these actions, an evaluation of the data bias and potential for false negatives and positives can be performed. If the resultant uncertainty level is unacceptable, then the following action may be taken:

- Additional sample collection and analysis

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United States Environmental Protection Agency. 1999a. Compendium of Methods for the Determination of Organic Compounds in Ambient Air. January 1999.

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Table 1
Environmental and Quality Control Sample Analyses

		QA/QC Samples					
Laboratory Parameter	**# of Proposed Samples**	**Field Blank**	**Trip Blank**	**Duplicate**	**MS**	**MSD**	**Total # of Samples**
Soils							
VOCs	30	2	3	2	2	2	41
SVOCs	30	2	3	2	2	2	41
Metals	30	2	3	2	2	2	41
PCBs	30	2	3	2	2	2	41
Pesticides	30	2	3	2	2	2	41
Perfluorinated Compounds	30	2	3	2	2	2	41
1-4, Dioxane	30	2	3	2	2	2	41
Groundwater							
VOCs	5	1	2	1	1	1	11
SVOCs	5	1	2	1	1	1	11
Metals	5	1	2	1	1	1	11
PCBs	5	1	2	1	1	1	11
Pesticides	5	1	2	1	1	1	11
Perfluorinated Compounds	5	1	2	1	1	1	11
1-4, Dioxane	5	1	2	1	1	1	11
Soil Vapor/Indoor Air/Outdoor Air							
VOCs	10	0	0	1	0	0	11

Table 2

Analyte	Water (ug/L)		Soil (ug/kg)		
	Laboratory MDL	Laboratory RL	Laboratory MDL	Laboratory Low Level RL	Laboratory Medium RL
Volatile Organic Compounds 8260 [1]					
1,1,1,2-Tetrachloroethane	0.35	1.0	0.31	5	500
1,1,1-Trichloroethane	0.26	1.0	0.36	5	500
1,1,2,2-Tetrachloroethane	0.48	1.0	0.33	5	500
1,1,2-Trichloroethane	0.42	1.0	0.25	5	500
1,1-Dichloroethane	0.27	1.0	0.58	5	500
1,1-Dichloroethene	0.29	1.0	0.61	5	500
1,2 Dichloroethane	0.46	1.0	0.25	5	500
1,2,3-Trichloropropane	0.32	1.0	0.51	5	500
1,2-Dibromo-3-chloropropane (DBCP)	0.47	1.0	0.37	5	500
1,2-Dibromoethane (EDB)	0.42	1.0	0.19	5	500
1,2-Dichlorobenzene	0.4	1.0	0.32	5	500
1,2-Dichloropropane	0.33	1.0	0.26	5	500
1,3-Dichlorobenzene	0.33	1.0	0.3	5	500
1,4-Dichlorobenzene	0.37	1.0	0.23	5	500
2-Butanone (MEK)	1.3	5.0	0.81	25	500
2-Chloroethyl vinyl ether	0.96	1.0	6.25	5	500
2-Hexanone	1.3	5.0	6.3	25	500
4-Methyl-2-pentanone (MIBK)	1.3	5.0	6.3	25	500
Acetone	1.3	5.0	1.1	5	500
Acrylonitile	1.39	5	25	200	500
Benzene	0.35	1.0	0.55	5	500
Bromochloromethane	0.4	1.0	0.36	5	500
Bromoform	0.26	1.0	0.46	5	500
Bromomethane	0.28	1.0	0.46	5	500
Carbon Disulfide	0.23	1.0	0.43	5	500
Carbon Tetrachloride	0.27	1.0	0.68	5	500
Chlorobenzene	0.32	1.0	0.51	5	500
Chloroethane	0.32	1.0	0.36	5	500
Chloroform	0.34	1.0	0.31	5	500
cis-1,2-Dichloroethene	0.22	1.0	0.25	5	500
cis-1,3-Dichloropropene	0.32	1.0	0.29	5	500
Dibromochloromethane	0.34	1.0	0.28	5	500
Dichlorobromomethane	0.39	1.0	0.26	5	500
Ethylbenzene	0.45	1.0	0.35	5	500
Iodomethane	0.27	1.0	0.61	5	500
Methyl Chloride	0.35	1.0	0.3	5	500
Methylene Chloride	0.44	1.0	2.2	5	500
Styrene	0.31	1.0	0.25	5	500
Tetrachloroethene	0.36	1.0	0.3	5	500
Toluene	0.51	1.0	0.85	5	500
Total Xylenes	0.93	1.0	2.9	15	500
trans-1,2-Dichloroethene	0.33	1.0	0.52	5	500
trans-1,3-Dichloropropene	0.37	1.0	0.64	5	500
trans-1,4-Dichloro-2-butene	2.12	5	0.36	5	500
Trichloroethene	0.32	1.0	0.35	5	500
Trichlorofluoromethane	0.15	1.0	0.55	5	500
Vinyl Acetate	1.29	5	0.36	5	500
Vinyl Chloride	0.24	1.0	0.2	10	500
Semivolatile Organic Compounds 8270 [1]					
1,2,4-Trichlorobenzene	0.11	10	4.83	330	330
1,2-Dichlorobenzene	0.14	10	3.23	330	330
1,3-Dichlorobenzene	0.14	10	3.02	330	330
1,4-Dichlorobenzene	0.16	10	2.22	330	330
2,4,5-Trichlorophenol	0.99	10	37	330	330
2,4,6 Trichlorophenol	0.99	10	11	330	330
2,4-Dichlorophenol	0.79	10	8.8	330	330
2,4-Dimethylphenol	0.96	10	46	330	330
2,4-Dinitrophenol	2.2	10	59	830	800
2,4-Dinitrotoluene	0.45	10	26	330	330
2,6 Dinitrotoluene	0.51	10	41	330	330
2-Chloronaphthalene	0.08	10	11	330	330
2-Chlorophenol	0.51	10	8.6	330	330
2-Methylnaphthalene	0.08	10	2	330	330
2-Methylphenol	0.23	10	5.1	330	330
2-Nitroaniline	0.5	10	54	830	800
2-Nitrophenol	0.6	10	7.7	330	330
3,3'-Dichlorobenzidine	0.37	10	148	330	600

Analyte	Water (ug/L)		Soil (ug/kg)		
	Laboratory MDL	Laboratory RL	Laboratory MDL	Laboratory Low Level RL	Laboratory Medium RL
Semivolatile Organic Compounds 8270 [1] (Cont'd.)					
3-Nitroaniline	1.5	10	39	830	800
4-Bromophenyl-phenylether	0.9	10	54	330	330
4-Chloro-3-Methylphenol	0.6	10	6.9	330	330
4-Chloroaniline	0.33	10	50	330	330
4-Chlorophenyl-phenylether	0.17	10	3.6	330	330
4,6-Dinitro-2-methylphenol	0.23	10	58	830	800
4-Methylphenol	0.35	10	9.4	330	330
4-Nitroaniline	0.46	10	19	830	800
4-Nitrophenol	1.5	10	41	830	800
Acenaphthene	0.11	10	2	330	330
Acenaphthylene	0.05	10	1.4	330	330
Anthracene	0.06	10	4.3	330	330
Benzo(a)anthracene	0.06	10	2.9	330	330
Benzo(b)fluoranthene	0.06	10	3.3	330	330
Benzo(k)fluoranthene	0.07	10	1.9	330	330
Benzo (g,h,i,) Perylene	0.08	10	2	330	330
Benzo(a)pyrene	0.09	10	4.1	330	330
Benzyl alcohol	0.29	10	8.06	330	330
bis(2-Chloroethoxy)methane	0.38	10	9.2	330	330
bis(2-chloroethyl)ether	0.18	10	15	330	330
bis(2-chloroisopropyl)ether	0.42	10	17.6	330	330
bis(2-Ethylhexyl) phthalate	4.8	10	54	330	330
Butyl benzyl phthalate	1.7	10	45	330	330
Chrysene	0.27	10	1.7	330	330
Di-n-butyl phthalate	0.3	10	58	330	330
Di-n-octyl phthalate	0.24	10	3.9	330	330
Dibenzo(a,h)anthracene	0.2	10	2	330	330
Dibenzofuran	0.1	10	1.8	330	330
Diethyl phthalate	0.11	10	5.1	330	330
Dimethylphthalate	0.3	10	4.4	330	330
Fluoranthene	0.1	10	2.4	330	330
Fluorene	0.07	10	2.4	330	330
Hexachlorobenzene	0.44	10	8.4	330	330
Hexachlorobutadiene	2.6	10	8.6	330	330
Hexachlorocyclopentadiene	2.5	10	51	330	330
Hexachloroethane	2.8	10	13	330	330
Indeno(1,2,3-cd)pyrene	0.15	10	4.7	330	330
Isophorone	0.32	10	8.4	330	330
N-Nitrosodimethylamine	1	10	12	330	330
N-Nitroso-di-n-propylamine	0.45	10	13	330	330
N-Nitrosodiphenylamine	0.26	10	9.2	330	330
Naphthalene	0.12	10	2.8	330	330
Nitrobenzene	0.54	10	7.5	330	330
Pentachlorophenol	5.1	10	58	830	800
Phenanthrene	0.11	10	3.5	330	330
Phenol	0.45	10	18	330	330
Pyrene	0.07	10	1.1	330	330

Metals				
Silver	0.00278	0.00333	0.641	0.641
Barium	0.00278	0.00333	1.28	1.28
Aresenic	0.00278	0.00333	1.28	1.28
Cadmium	0.00278	0.00333	0.385	0.385
Chromium	0.00278	0.00333	0.641	0.641
Mercury	0.000095	0.002	0.0385	0.0385
Lead	0.00144	0.00333	0.641	0.641
Selenium	0.00278	0.00333	1.28	1.28

Table 2

Volatile Organics, 8260 - Comprehensive	**Semi-Volatiles, 8270 - Comprehensive**
Dilution Factor	**Dilution Factor**
1,1,1,2-Tetrachloroethane	1,1-Biphenyl
1,1,1-Trichloroethane	1,2,4,5-Tetrachlorobenzene
1,1,2,2-Tetrachloroethane	1,2,4-Trichlorobenzene
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	1,2-Dichlorobenzene
1,1,2-Trichloroethane	1,2-Diphenylhydrazine (as Azobenzene)
1,1-Dichloroethane	1,3-Dichlorobenzene
1,1-Dichloroethylene	1,4-Dichlorobenzene
1,2,3-Trichlorobenzene	2,3,4,6-Tetrachlorophenol
1,2,3-Trichloropropane	2,4,5-Trichlorophenol
1,2,4-Trichlorobenzene	2,4,6-Trichlorophenol
1,2,4-Trimethylbenzene	2,4-Dichlorophenol
1,2-Dibromo-3-chloropropane	2,4-Dimethylphenol
1,2-Dibromoethane	2,4-Dinitrophenol
1,2-Dichlorobenzene	2,4-Dinitrotoluene
1,2-Dichloroethane	2,6-Dinitrotoluene
1,2-Dichloropropane	2-Chloronaphthalene
1,3,5-Trimethylbenzene	2-Chlorophenol
1,3-Dichlorobenzene	2-Methylnaphthalene
1,4-Dichlorobenzene	2-Methylphenol
1,4-Dioxane	2-Nitroaniline
2-Butanone	2-Nitrophenol
2-Hexanone	3- & 4-Methylphenols
4-Methyl-2-pentanone	3,3-Dichlorobenzidine
Acetone	3-Nitroaniline
Acrolein	4,6-Dinitro-2-methylphenol
Acrylonitrile	4-Bromophenyl phenyl ether
Benzene	4-Chloro-3-methylphenol
Bromochloromethane	4-Chloroaniline
Bromodichloromethane	4-Chlorophenyl phenyl ether
Bromoform	4-Nitroaniline
Bromomethane	4-Nitrophenol
Carbon disulfide	Acenaphthene
Carbon tetrachloride	Acenaphthylene
Chlorobenzene	Acetophenone
Chloroethane	Aniline
Chloroform	Anthracene
Chloromethane	Atrazine
cis-1,2-Dichloroethylene	Benzaldehyde
cis-1,3-Dichloropropylene	Benzidine
Cyclohexane	Benzo(a)anthracene
Dibromochloromethane	Benzo(a)pyrene
Dibromomethane	Benzo(b)fluoranthene
Dichlorodifluoromethane	Benzo(g,h,i)perylene
Ethyl Benzene	Benzo(k)fluoranthene
Hexachlorobutadiene	Benzoic acid
Isopropylbenzene	Benzyl alcohol
Methyl acetate	Benzyl butyl phthalate
Methyl tert-butyl ether (MTBE)	Bis(2-chloroethoxy)methane
Methylcyclohexane	Bis(2-chloroethyl)ether
Methylene chloride	Bis(2-chloroisopropyl)ether
n-Butylbenzene	Bis(2-ethylhexyl)phthalate
n-Propylbenzene	Caprolactam
o-Xylene	Carbazole
p- & m- Xylenes	Chrysene
p-Isopropyltoluene	Dibenzo(a,h)anthracene
sec-Butylbenzene	Dibenzofuran
Styrene	Diethyl phthalate
tert-Butyl alcohol (TBA)	Dimethyl phthalate
tert-Butylbenzene	Di-n-butyl phthalate
Tetrachloroethylene	Di-n-octyl phthalate
Toluene	Fluoranthene
trans-1,2-Dichloroethylene	Fluorene
trans-1,3-Dichloropropylene	Hexachlorobenzene
trans-1,4-dichloro-2-butene	Hexachlorobutadiene
Trichloroethylene	Hexachlorocyclopentadiene
Trichlorofluoromethane	Hexachloroethane
Vinyl Chloride	Indeno(1,2,3-cd)pyrene
Xylenes, Total	Isophorone
	Naphthalene
	Nitrobenzene
	N-Nitrosodimethylamine
	N-nitroso-di-n-propylamine
	N-Nitrosodiphenylamine
	Pentachlorophenol
	Phenanthrene
	Phenol
	Pyrene

Pesticides, 8081 target list
Dilution Factor
4,4'-DDD
4,4'-DDE
4,4'-DDT
Aldrin
alpha-BHC
beta-BHC
Chlordane, total
delta-BHC
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin ketone
gamma-BHC (Lindane)
Heptachlor
Heptachlor epoxide
Methoxychlor
Toxaphene

Metals, Target Analyte
Dilution Factor
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc

Mercury by 7473
Dilution Factor
Mercury

Polychlorinated Biphenyls (PCB)
Dilution Factor
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Total PCBs

Table 3

Sample Containers, Preservation Methods, and Holding Times Requirements

Parameter	Method	Container	Preservation	Maximum Holding Time
Soil Samples				
VOCs	8260C	Terra Core	methanol, deionized water 4 degrees C	14 days
SVOCs	8270	1 8 (oz) glass jar	Cool 4 degress C	7 days
Pesticides/PCBs	8081/8082	1 8 (oz) glass jar	Cool 4 degress C	7 days
Metals	6010	1 8 (oz) glass jar	Cool 4 degress C	14 days
Groundwater Samples				
VOCs	8260C	Two 40 mil vials	HCL to pH<2	14 days
SVOCs	8270	250 mil glass	None	7 days
Pesticides/PCBs	8081/8082	250 mil glass	None	7 days
TAL Metals (unfiltered)	6010C	250 mil plastic	HNO3	14 days
TAL Metals (filtered)	6010C	250 mil plastic	HNO3	14 days
Air Samples				
VOCs	TO-15	6-liter SUMMA Canister	NA	30 Days

Appendix B

Health and Safety Plan

Health and Safety Plan

for

68-19 Woodhaven Blvd.

Queens, New York 11374

BCP Site No. (to be assigned)

Prepared for

68-19 Rego Park LLC
148-29 Cross Island Parkway
Queens, New York 11357

Submitted to:

New York State Department of Environmental Conservation

Prepared by

Preferred Environmental Services

323 Merrick Avenue, North Merrick, New York 11566

May 2021

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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 68-19 Woodhaven Blvd. Queens, 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 evaluated 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

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).

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
Bryan Comey	Senior Geologist	Preferred Environmental Services	516 546 1100	Field Task Manager
Daniel Prisco-Buxbaum	Senior Geologist	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.

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.

- 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 Proeprty 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.

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 sorts, 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
- 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 SSHO 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**

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;
  - All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and

- All overhead hazards will be identified prior to commencing work operations.

- **Fire/Explosion:**
  - ABC type fire extinguishers will be readily available; and
  - No smoking in work area.

- **Pinch/Cut/Smash:**
  - Cut resistant Kevlar work gloves will be worn when dealing with sharp objects;
  - All hand and power tools will be maintained in safe condition; and
  - Guards will be kept in place while using hand and power tools.

4.2 AIR MONITORING

Therefore, Preferred will implement a air monitoring plan during the conduct of the soil sampling activities. The air monitoring will be implemented during the installation of soil borings and during soil sampling activities to be completed as part of the SC activities. The purpose of the air monitoring is to provide a measure of protection for the area immediately adjacent to the work zone, from potential airborne contaminant releases as a result of SC activities performed at the Site.

Particulate monitoring will be conducted during ground intrusive activities at the Site. Dust and particulate monitoring will be conducted near the approximate downwind perimeter of the work/exclusion zone, when possible, or where dust generating operations are apparent.

Particulate air monitoring will be conducted with a DustTrak (or a similar device). This instrument is equipped with an audible alarm (indication of exceedance) and is capable of measuring particulate matter less than 10 micrometers in size (PM-10). It will continually record emissions (calculating 15-minute running average concentrations) generated during field activities. The dust monitoring devices will be checked and recorded periodically throughout the day of intrusive activities to assess emissions and the need for corrective action.

Particulate monitoring response and action levels include:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m3) greater than background (upwind perimeter - established earlier in the day) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 ug/m3 above the upwind level and provided that no visible dust is migrating from the work area;

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures 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.

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 contaminates 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.

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 repellant 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.

- **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 95ºF (35ºC); 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

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

Bryan Comey cell: 610-585-1124

Daniel Prisco Buxbaum cell: 516 987-2472

Chris Murphy cell: 631-942-6624

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

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.

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.

- 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.

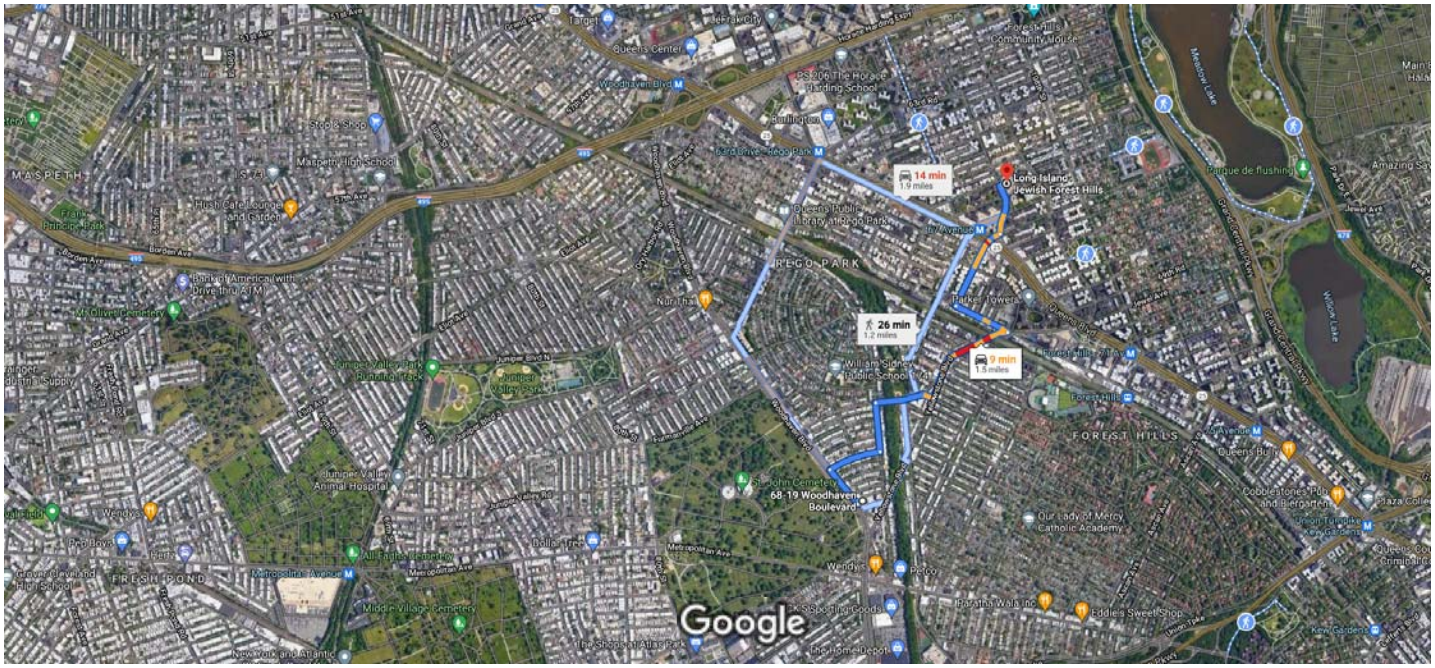
All Preferred employees receive periodic medical examinations. Because of the low potential for exposure to hazardous agents, it is not expected that additional medical surveillance will be required for any personnel undertaking this project. If necessary, non-Preferred personnel will be required to acknowledge coverage by a medical surveillance program sufficient to satisfy the requirements of 29 CFR 1910.120.

FIGURES

Google Maps

68-19 Woodhaven Boulevard, Queens, NY to Long Island Jewish Forest Hills

Drive 1.5 miles, 9 min



68-19 Woodhaven Blvd

Flushing, NY 11374

1. Head northwest on Woodhaven Blvd toward 68th Ave

18 s (0.1 mi)

Take Fleet St to Yellowstone Blvd

2 min (0.5 mi)

2. Turn right onto 67th Rd

0.2 mi

3. Turn left onto Alderton St

0.1 mi

4. Turn right onto Fleet St

0.2 mi

5. Turn left onto Yellowstone Blvd

2 min (0.3 mi)

Take 67th Rd to 102nd St

4 min (0.6 mi)

6. Sharp left onto Austin St

0.2 mi

7. Turn right onto 67th Rd

0.3 mi

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? _____

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

	Doc #		Doc #		Doc #
☐ Not applicable		☐ Working at Height		☐ Confined Space	
☐ Energy Isolation (LOTO)		☐ Excavation/Trenching		☐ Hot Work	
☐ Mechanical Lifting Ops		☐ Overhead & Buried Utilities		☐ Other permit	

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

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

☐ Gravity (i.e., ladder, scaffold, trips) (L M H)	☐ Motion (i.e., traffic, moving water) (L M H)	☐ Mechanical (i.e., augers, motors) (L M H)
☐ Electrical (i.e., utilities, lightning) (L M H)	☐ Pressure (i.e., gas cylinders, wells) (L M H)	☐ Environment (i.e., heat, cold, ice) (L M H)
☐ Chemical (i.e., fuel, acid, paint) (L M H)	☐ Biological (i.e., ticks, poison ivy) (L M H)	☐ Radiation (i.e., alpha, sun, laser) (L M H)
☐ Sound (i.e., machinery, generators) (L M H)	☐ Personal (i.e. alone, night, not fit) (L M H)	☐ 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	☐ Substitution	☐ Isolation
☐	Engineering controls	☐ Administrative controls	☐ Monitoring
☐	General PPE Usage	☐ Hearing Conservation	☐ Respiratory Protection
☐	Personal Hygiene	☐ Exposure Guidelines	☐ Decon Procedures
☐	Emergency Action Plan (EAP)	☐ Fall Protection	☐ Work Zones/Site Control
☐	JLA to be developed/used ***(specify)***	☐ LPO conducted ***(specify job/JLA)***	☐ 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 1st 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

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

Ref. No.: 2001
Date: 7/26/2010

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 +/-.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+/-.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 Required	: Normal	Protective Clothing	: Neoprene or other chemical resistant gloves, safety goggles or chemical face shield. 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.

REGENESIS

Technology-Based Solutions for the Environment

SAFETY DATA SHEET

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.

Chemical stability	Undergoes hydrolysis in water to form lactic acid and glycerol.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Bases. Acids.
Hazardous decomposition products	Thermal decomposition or combustion may produce: carbon oxides, phosphorus compounds, metal oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye damage.
Ingestion	Ingestion may cause irritation and malaise.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity

Components	Species	Test Results
Glycerin (CAS 56-81-5)		
Acute		
Oral		
LD50	Rat	12600 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye damage.
Respiratory or skin sensitization	
Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	Material is readily degradable and undergoes hydrolysis in several hours.
Bioaccumulative potential	No data available.

Partition coefficient n-octanol / water (log Kow)

Glycerin (CAS 56-81-5)	-1.76
Lactic acid (CAS 50-21-5)	-0.72

Mobility in soil	No data available.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

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

15. Regulatory information

US federal regulations

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
One or more components are not listed on TSCA.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Glycerin (CAS 56-81-5)

US. New Jersey Worker and Community Right-to-Know Act

Glycerin (CAS 56-81-5)

US. Pennsylvania Worker and Community Right-to-Know Law

Glycerin (CAS 56-81-5)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 10-April-2015

Revision date -

Version # 01

Further information HMIS® is a registered trade and service mark of the American Coatings Association (ACA).

HMIS® ratings Health: 3
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.

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, CO_2, 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

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

Ingredient name	Exposure limits
acetone	**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. **NIOSH REL (United States, 1/2013).** TWA: 590 mg/m³ 10 hours. TWA: 250 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 2400 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. **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.

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 : C3-H6-O

Boiling/condensation point : 56.05°C (132.9°F)

Melting/freezing point : -94.7°C (-138.5°F)

Critical temperature : 234.85°C (454.7°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -20°C (-4°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : 6.06 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 2.5%
Upper: 13%

Vapor pressure : 24 kPa (180.014626188 mm Hg) [room temperature]

Section 9. Physical and chemical properties

Vapor density : 2 (Air = 1)

Specific Volume (ft ^{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 LD50 Oral	Rat Rat	59528 ppm 5800 mg/kg	1 hours -

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.

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** 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) : 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.)

Section 16. Other information

Physical hazards	0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

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

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

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

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

History

Date of printing	:	4/26/2015.
Date of issue/Date of revision	:	4/26/2015.
Date of previous issue	:	10/21/2014.
Version	:	0.02
Key to abbreviations	:	ATE = Acute Toxicity Estimate 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 NationsACGIH – 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

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.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : ethanol

Other means of identification : ethyl alcohol; Denatured Alcohol; ALCOHOL; Ethyl alcohol (Ethanol)

CAS number/other identifiers

CAS number : 64-17-5

Product code : 001114

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

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

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

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Section 4. First aid measures

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, 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/m³ 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 1000 ppm 10 hours. TWA: 1900 mg/m³ 10 hours.

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 : C2-H6-O

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

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 (ft^3/lb)	:	1.2716
Gas Density (lb/ft^3)	:	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

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 II Chemicals : Not listed

Section 15. Regulatory information

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

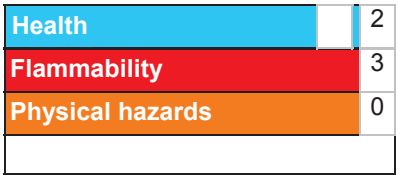
WHMIS (Canada) : Class B-2: Flammable liquid
Class D-2B: Material causing other toxic effects (Toxic).

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.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

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

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

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

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

History

Date of printing : 5/18/2015.

Date of issue/Date of revision : 5/18/2015.

Date of previous issue : 10/28/2014.

Version : 0.02

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – 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 symptomsveffects, 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.

OReNexposure signsvsymptoms

Eye contact : Adverse symptoms may include the following:
irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Section 4. First aid measures

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

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

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

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

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

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No 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. Collect spillage.

- ethods 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	**ACGIH TLV (United States, 3/2012).** **Absorbed through skin.** TWA: 50 ppm 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 180 mg/m³ 8 hours. TWA: 50 ppm 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: 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
Boilingvcondensation point	:	68.73°C (155.7°F)
- eltingvfreezing 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.
ERaporation 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 explosiRe (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}Vlb)	:	1.5138
Gas Density (lbvft ^{3})	:	0.6606 (25°C / 77 to °F)
/ elatiRe density	:	0.7
Solubility	:	Not available.
Solubility in water	:	0.0098 g/l
Partition coefficient: nN octanolwater	:	4
AutoNignition 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 reactiRity

/ eactiRity	:	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 aRoid	:	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. LC50 Inhalation Vapor LD50 Oral	Rat Rat Rat	48000 ppm 96000 ppm 15840 mg/kg	4 hours 1 hours -

Irritation/Corrosion

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

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

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

Specific target organ toxicity (repeated exposure)

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

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

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.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
n-hexane	4	501.187	high

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	Mexico	IMDG	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 

Section 14. Transport information

Packing group	II	II	II	II	II
Environment	No.	No.	No.	Yes.	No.
Additional information	**Reportable quantity** 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.	**Explosive Limit and Limited Quantity Index** 1 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** 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 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) : 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
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Section 15. / egulatory information

Mame	%	Fire hazard	Sudden release of pressure	/ eactiRe	Immediate (acute) health hazard	Delayed (chronic) health hazard
n-hexane	100	Yes.	No.	No.	Yes.	Yes.

SA/ A 313

	Product name	CAS number	%
Form / N/ eporting requirements	n-hexane	110-54-3	100
Supplier notification	n-hexane	110-54-3	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

- assachusetts : This material is listed.
Mew York : This material is listed.
Mew Jersey : This material is listed.
PennsylRania : This material is listed.

Canada inRentory : This material is listed or exempted.

International regulations

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

Chemical Weapons ConRention List Schedule I Chemicals : Not listed

Chemical Weapons ConRention List Schedule II Chemicals : Not listed

Chemical Weapons ConRention List Schedule III Chemicals : Not listed

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 0N4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although H- IS® ratings are not required on SDSs under 29 CF/ 1910. 1200, the preparer may choose to proRide them. H- IS® ratings are to be used with a fully implemented H- IS® program. H- IS® is a registered mark of the Mational Paint & Coatings Association (MPCA). H- IS® materials may be purchased exclusiReely from J. J. Keller (800) 327N6868.

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

Mational Fire Protection Association (U.S.A.)

/ eprinted with permission from MFPA 704N2001, Identification of the Hazards of - aterials for Emergency / esponse Copyright ©1997, Mational Fire Protection Association, Quincy, - A 02269. This reprinted material is not the complete and official position of the Mational Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

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

History

Date of printing : 5/20/2015.

Date of issueVDate of reRision : 5/20/2015.

Date of preRious issue : 10/16/2014.

Version : 0.03

Key to abbreRiations : 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 NationsACGIH – 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)

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

/ eferences : Not available.

Indicates information that has changed from preRiously issued Rersion.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. HoweRer, neither the aboRenamed supplier, nor any of its subsidiaries, assumes any liability whatsoeRer 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/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 breathing vapor. Wash hands thoroughly after handling. Use and store only outdoors or in a well ventilated place.

Section 2. Hazards identification

/ esponse : 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 : Isopropyl alcohol

Other means of identification : propan-2-ol; 2-Propanol; isopropanol; isopropyl alcohol

CAS number/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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

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

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, 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. Fire-fighting measures

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).

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	**ACGIH TLV (United States, 3/2012).** TWA: 200 ppm 8 hours. STEL: 400 ppm 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 400 ppm 8 hours. TWA: 980 mg/m³ 8 hours. STEL: 500 ppm 15 minutes. STEL: 1225 mg/m³ 15 minutes. **- IOSH / EL (United States, 1/2013).** TWA: 400 ppm 10 hours. TWA: 980 mg/m³ 10 hours. STEL: 500 ppm 15 minutes. STEL: 1225 mg/m³ 15 minutes. **OSHA PEL (United States, 6/2010).** TWA: 400 ppm 8 hours. TWA: 980 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.

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 : C3-H8-O

Boiling/condensation point : 83°C (181.4°F)

Melting/freezing point : -90°C (-130°F)

Critical temperature : Not available.

Odor : Alcohol-like.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: 11.7°C (53.1°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : 1.7 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 2%
Upper: 12%

Vapor pressure : 4.4 kPa (33.002681467 mm Hg) [room temperature]

Vapor density : 2.1 (Air = 1)

Specific Volume (ft^3/lb) : 1.2739

Gas Density (lb/ft^3) : 0.785

Relative density : 0.79

Section 9. Physical and chemical properties

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: nM octanolRwater : 0.05

AutoMgnition temperature : 456°C (852.8°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

/ eactivity : 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

ProductRngredient name	/ esult	Species	Dose	Exposure
propan-2-ol	LC50 Inhalation Gas. LD50 Dermal LD50 Oral	Rat Rabbit Rat	45248 ppm 12800 mg/kg 5000 mg/kg	1 hours - -

IrritationRCorrosion

ProductRngredient name	/ esult	Species	Score	Exposure	Observation
propan-2-ol	Eyes - Moderate irritant Eyes - Moderate irritant Eyes - Severe irritant Skin - Mild irritant	Rabbit Rabbit Rabbit Rabbit	- - - -	24 hours 100 milligrams 10 milligrams 100 milligrams 500 milligrams	- - - -

Sensitization

Not available.

Section 11. Toxicological information

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/Ingredient name	OSHA	IARC	TLV
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

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 Acute LC50 4200 mg/l Fresh water	Crustaceans - Crangon crangon Fish - Rasbora heteromorpha	48 hours 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	Mexico	IMDG	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	**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 / oad or / ail Index** 5	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 5 L **Cargo Aircraft Only** Quantity limitation: 60 L **Limited Quantities M Passenger Aircraft** 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 73R78 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 302/304

Composition/information on ingredients

No products were found.

SA/ A 304 / Q : Not applicable.

SA/ A 311/312

Classification : Fire hazard
Immediate (acute) health hazard

Composition/information on ingredients

- ame	%	Fire hazard	Sudden release of pressure	/ eactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
propan-2-ol	100	Yes.	No.	No.	Yes.	No.

SA/ A 313

	Product name	CAS number	%
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

Massachusetts : 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.
N alaysia Inventory (EHS / egister): Not determined.
- ew Zealand Inventory of Chemicals (- ZIoC): 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

WHN IS (Canada) : Class B-2: Flammable liquid
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is not listed.
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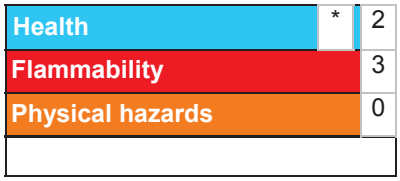
Section 16. Other information

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

Hazardous N aterial Information System (U.S.A.)



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- ational Fire Protection Association (U.S.A.)

Section 16. Other information

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Copyright ©2001, - ational Fire Protection Association, Quincy, N A 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in - 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.

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Version : 0.02

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ATE = Acute Toxicity Estimate
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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 NationsACGIH – 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

/ eferences : Not available.

Indicates information that has changed from previously issued version.

- otice to reader

Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Appendix C

Health and Safety Plan Acceptance and Training Acknowledgement

Instructions: This form is to be completed by each person that works on this project at the Subject Property and returned to the Site Safety and Health Officer.

I have read and agree to abide by the contents of the SITE-SPECIFIC HEALTH AND SAFETY PLAN for work activities at the site. I have completed the training requirements specified in the plan. I am currently participating in a medical surveillance program that satisfies the requirements of CFR 1910.120.

Signature:	Date:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Return to:

Site Safety and Health Officer at
Preferred Environmental Services
323 Merrick Avenue
North Merrick, New York 11566

Appendix D

Report of Accident/Injury Form

PREFERRED ENVIRONMENTAL SERVICES

323 Merrick Avenue, North Merrick, New York 11566

Accident / Injury Report Form

Name: _____ Sex: ___Male ___ Female

Address: _____
Street City State Zip Code

Telephone: _____ E-Mail: _____ Social Security Number: _____

Date of This Report: _____ Date of Accident: _____

Time of Accident: _____ a.m. ./ p.m. Place of Accident: _____

NATURE OF INJURY

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

Other (specify) _____

PART OF BODY INJURIED

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) _____

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: _____
   Address: _____
   Phone #: _____
   E-Mail: _____

2. Witness: _____
   Address: _____
   Phone #: _____
   E-Mail: _____

Date: _____ Acknowledgement of Injuried Party: _____

Form Submitted by: _____ Signature & Date: _____

Please attach additional comments / information on back of sheet